King Faisal University
College of Medicine
Internal Medicine Department

Medicine Student Manual

Academic year 2020-2021

Week- Skin Problems

Theoretical Background to Skin Problems

The Medicine block starts with a week on skin problems. The students are expected to learn the important general aspects of consultation in these subjects, along with specific history-taking and inspection. This week's CiA, CiB and PS sessions focus on four pathologies. You can apply your learning approach in these sessions to all the other pathologies in these subject areas.

Dermatology
The reference textbook for Dermatology is **Fitzpatrick's Color Atlas and Synopsis of Clinical Dermatology, 7th edition by Klaus Wolff** and reading of this text is compulsory for the students prior to this CTC week. Background information can also be obtained from DOIT (Dermatology Online with Interactive Technology) on www.cyberderm.net, an interactive, systematic, problem-centred online dermatology programme.

Important topics to be covered in Dermatology:

1. Vesicular dermatoses
- Eczema
- Viral infections(Herpes simplex, varicella, herpes zoster)

2. Pustular dermatoses
- Sterile pustule(eg: pustular psoriasis).
- Non-sterile pustule(Bacterial skin and hair infections, pityrosporum infections)

3. Red scaly (erythemato-squamous) dermatoses
- Seborrhoeic dermatitis
- Psoriasis
- Chronic eczema
- Fungal infections (dermatophytosis, tinea versicolor, candidiasis)
- Pityriasis rosea

4. Papular dermatoses
- Verruca vulgaris
- Molluscum contagiosum
- Lichen planus
- Prurigo simplex
- Urticaria

5. Nodular dermatoses
- Skin malignancies
- Prurigo nodularis
- Sarcoidosis
- Erythema nodosum,
- Cutaneous lymphoma,
- Cutaneous metastasis

6. Bullous dermatoses
- Autoimmune blistering diseases:(pemphigus vulgaris, bullous pemphigoid, dermatitis herpetiformis)
- Bullous erythema multiforme
- Pompholyx
- Porphyria
- Burns and insect bites
- Diabetes associated skin changes
- Erysipelas
- Epidermolysis bullosa
- Hailey-Hailey disease

- Bullous impetigo

7. Erythematous dermatoses (red macules, macule = patch, change in skin surface colour) e.g.:

- Naevus flammeus (port-wine stain)
- Exanthema
- Erysipelas
- Pernio (chillblains)
- Acrocyanosis,
- Livedo reticularis

Reference textbook:

Fitzpatrick's color Atlas and Synopsis of Clinical Dermatology,7th edition by Klaus Wolff

Resources for self learning :

1) http://www.aad.org .Open the website and click on the link ***'for dermatologists'***.Then click on the link '***education and quality care'***. Select the option '***Basic dermatology curriculum'***.kindly read all the topics in '***learning module'*** included in the syllabus which includes basic skin examination and other specific skin topics.Please click on the link ***'video library'*** and watch all the skin procedures (diagnostic and therapeutic).the students can also click on the link ***'quiz library and learning guides'*** to practice MCQs for the exam at the end of the block.

2) The students are expected to learn the steps of intake of new patients, case history, clinical examination,coming at a working diagnosis,order investigations to confirm the diagnosis, make a final diagnosis,plan the treatment strategy and give patient advice and information (verbal and written).

3) The students should focus their attention on description of the various skin lesions and on specific investigations to be done for skin diseases and understanding treatment of basic skin lesions.

Dermatological examination theory :

PHYSICAL EXAMINATION

The entire skin should be inspected and this should include mucous membranes, genital and anal regions,as well as hair and nails and peripheral lymph nodes. Reading the skin is like reading a text.The basic skin lesions are like the letters of the alphabet: their shape, color, margination, and other features combined will lead to words, and their localization and distribution to a sentence or paragraph. The prerequisite of dermatologic diagnosis is thus the recognition of (1) the type of skin lesion, (2) the color, (3) margination,(4) consistency, (5) shape, (6) arrangement and (7) distribution of lesions.

TYPES OF SKIN LESIONS

Typically, most skin diseases produce or present with lesions that have more or less distinct characteristics. They may be uniform or diverse in size, shape, and color, and may be in different stages of evolution or involution. The original lesions are known as *the* ***primary lesions***, and identification of such lesions is the most important aspect of the dermatologic physical examination. They may continue to full development or be modified by regression, trauma, or other extraneous factors, producing ***secondary lesions.***

Primary lesions

Primary lesions are of the following forms: macules (or patches), papules, plaques, nodules, tumors, wheals, vesicles, bullae, and pustules.

• **Macule** (Latin: *macula*,"spot") **:** A macule is a circumscribed area of change in skin color without elevation or depression. It is thus not palpable. Macules can be well- and ill defined.Macules may be of any size or color (White, as in vitiligo; brown, as in café-au-lait spots; blue, as in Mongolian spots; or red, as in permanent vascular abnormalities such a port-wine stains or capillary dilatation due to inflammation (erythema). Pressure of a glass slide (*diascopy*) on the border of a red lesion detects the extravasation of red blood cells. If the redness remains under pressure from the slide, the lesion is purpuric, that is,results from extravasated red blood cells; if the redness disappears, the lesion is due to vascular dilatation. A rash consisting of macules is called a *macular exanthem*.

• **Papule** (Latin: *papula*, "pimple") A papule is a superficial, elevated, solid lesion, generally considered <0.5 cm in diameter. Most of it is elevated above, rather than deep within, the plane of the surrounding skin .A papule is palpable. It may be well- or ill defined. In papules the elevation is caused by metabolic or locally produced deposits, by localized cellular infiltrates, inflammatory soft upon palpation. They may be domeshaped and smooth or may have a warty surface or crater-like central depression.

• **Wheal:** A wheal is a rounded or flat-topped,pale red papule or plaque that is characteristically evanescent, disappearing within 24–48 h . It is due to edema in the papillary body of the dermis. Wheals may be round, gyrate, or irregular with pseudopods—changing rapidly in size and shape due to shifting papillary edema. A rash
consisting of wheals is called a *urticarial exanthema* or *urticaria*.

• **Vesicle-Bulla (Blister)** (Latin: *vesicula*, "little bladder"; *bulla*, "bubble") A vesicle (<0.5 cm)
or a bulla (>0.5 cm) is a circumscribed, elevated, superficial cavity containing fluid . Vesicles are dome-shaped (as in contact dermatitis, dermatitis herpetiformis),umbilicated (as in herpes simplex), or flaccid (as in pemphigus). Often the roof of a vesicle/bulla is so thin that it is transparent,and the serum or blood in the cavity can be seen. Vesicles containing serum are yellowish; those containing blood from red to black. Vesicles and bullae arise from a cleavage at various levels of the superficial skin; the cleavage may be subcorneal or within
the visible epidermis (i.e., intraepidermal vesication) or at the epidermal–dermal interface
(i.e., sub. Since vesicles/bullae are always superficial they are always well defined. A rash consisting of vesicles is called a *vesicular exanthem*; a rash consisting of bullae a *bullous exanthem*.

• **Pustule** (Latin: *pustula*, “pustule”) A pustule is a circumscribed superficial cavity of the skin that contains a purulent exudates, which may be white, yellow,greenish-yellow, or hemorrhagic. Pustules thus differ from vesicles in that they are not clear but have a turbid content. This process may arise in a hair follicle or independently.Pustules may vary in size and shape. Pustules are usually dome-shaped, but follicular pustules are conical and usually contain a hair in the center. The vesicular lesions of herpes simplex and varicella zoster virus infections may become pustular. A rash consisting of pustules is called a *pustular exanthem*.

Nodules

Nodules are morphologically similar to papules, but they are larger than 0.5 cm in diameter. They most frequently are centered in the dermis or subcutaneous fat.

Secondary lesions

Secondary lesions are of many kinds; the most important are scales, crusts, erosions, ulcers, fissures, and scars.

• Crusts (Latin: *crusta*, “rind, bark, shell”) Crusts develop when serum, blood, or purulent exudate dries on the skin surface .Crusts may be thin, delicate, and friable or thick and adherent. Crusts are yellow when formed from dried serum; green or yellowgreen when formed from purulent exudate; or brown, dark red, or black when formed from blood. Superficial crusts occur as honeycolored, delicate, glistening particulates on the surface and are typically found in impetigo.When the exudate involves the entire epidermis, the crusts may be thick and adherent, and if it is accompanied by necrosis of the deeper tissues (e.g., the dermis), the condition is known as *ecthyma*.

• **Scales** (squames) (Latin: *squama*, “scale”) Scales are flakes of stratum corneum . They may be large (like membranes, tiny [like dust], pityriasiform (Greek: *pityron*, “bran”), adherent, or loose. A rash consisting of papules with scales is called a *papulosquamous exanthem*.

• **Erosion**: An erosion is a defect only of the epidermis,not involving the dermis, in contrast to an ulcer, which always heals with scar formation ,an erosion heals without a scar. An erosion is sharply defined, is red, and oozes. There are superficial erosions, which are subcorneal or run through the epidermis, and deep erosions, the base of which is the papillary body . Except physical abrasions, erosions are always the result of intraepidermal or subepidermal cleavage and thus of vesicles or bullae.

Ulcer (Latin: *ulcus*, “sore”) An ulcer is a skin defect that extends into the dermis or deeper into the subcutis and always occurs within pathologically altered tissue. An ulcer is therefore always a secondary phenomenon.The pathologically altered tissue giving rise to an ulcer is usually seen at the border or the base of the ulcer and is helpful in determining its cause. Other features helpful in this respect are whether borders are elevated, undermined, hard, or soggy; location of the ulcer; discharge; and any associated topographic features, such as nodules, excoriations, varicosities, hair distribution, presence or absence of sweating, and arterial pulses.Ulcers always heal with scar formation.

Fissures (cracks, clefts)

A fissure is a linear cleft through the epidermis or into the dermis. They occur most commonly when the skin is thickened and inelastic from inflammation and dryness, especially in regions subjected to frequent movement. Such areas are the tips and flexural creases of the thumbs, fingers, and palms; the edges of the heels; the clefts between the fingers and toes; at the angles of the mouth; the lips; and about the nares, auricles, and anus. When the skin is dry, exposure to cold, wind, water, and cleaning products (soap, detergents) may produce a stinging, burning sensation, indicating microscopic fissuring is present. This may be referred to as chapping, as in *“chapped lips.”*

Scar :A scar is the fibrous tissue replacement of the tissue defect by previous ulcer or a wound. Scars can be hypertrophic and hard or atrophic and soft with a thinning or loss of all tissue compartments of the skin.

• **Atrophy** : This refers to a diminution of some or all layers of the skin. Epidermal atrophy is manifested by a thinning of the epidermis, which becomes transparent, revealing the papillary and subpapillary vessels;there are loss of skin texture and cigarette paper-like wrinkling. In dermal atrophy,there are loss of connective tissue of the dermis and depression of the lesion .

• **Cyst**: A cyst is a cavity containing liquid or solid or semisolid materials and may be superficial or deep. Visually it appears like a spherical, most often dome-shaped papule
or nodule, but upon palpation it is resilient. It is lined by an epithelium and often has
a fibrous capsule; depending on its contents it may be skin colored, yellow, red, or blue.
An epidermal cyst producing keratinaceous material and a pilar cyst that is lined by a multilayered epithelium

General history:
Interpretation of the clinical picture may be difficult, because identical manifestations may result from widely different causes. Moreover, the same etiologic factors may give rise to a great diversity of eruptions. There is one great advantage in dermatology: namely, that of dealing with an organ that can be seen and felt. Smears and cultures may be readily made for bacteria and fungi. Biopsy and histologic examination of skin lesions are usually very minor procedures, making histopathology an important component of the evaluation in many clinical situations. Given the ease of histologic confirmation of diagnoses in skin diseases, the threshold for biopsy should be low. This is especially true of inflammatory dermatoses, potentially infectious conditions, and skin disorders in immunosuppressed and hospitalized patients where clinical morphology may be atypical. Once therapy is begun empirically, histologic features may be altered by the treatment, making pathologic diagnosis more difficult.

History:
Demographics Age, race, sex, and occupation.
History:
1. Constitutional symptoms
- "Acute illness" syndrome: headaches,chills, feverishness, and weakness
- "Chronic illness" syndrome: fatigue,weakness, anorexia, weight loss, and malaise

2. History of skin lesions. Seven key questions:
- When? Onset
- Where? Site of onset
- Does it itch or hurt? Symptoms
- How has it spread (pattern of spread)? Evolution
- How have individual lesions changed? Evolution
- Provocative factors? Heat, cold, sun, exercise, travel history, drug ingestion, pregnancy, season
- Previous treatment(s)? Topical and systemic

3. General history of present illness
It is indicated by clinical situation, with particular attention to constitutional and prodromal symptoms

4. Past medical history
- Operations?
- Illnesses? (hospitalized?)
- Allergies? especially drug allergies
- Medications? (present and past)
- Habits? (smoking, alcohol intake, drug abuse)
- Atopic history ? (asthma, hay fever,eczema)

5. Family medical history

psoriasis, atopy, melanoma, xanthomas or tuberous sclerosis)

6. Social history:

occupation, hobbies, exposures, travel,injecting drug use

7. Sexual history:

History of risk factors of HIV: blood transfusions, IV drugs, sexually active, multiple partners, sexually transmitted disease?

8. Travel history

Habitation in certain parts of the world predisposes to distinctive diseases for that particular geographic locale.eg San Joaquin Valley fever (coccidioidomycosis), Hansen's disease, leishmaniasis, and histoplasmosis are examples

Knowledge of the patient's age, health, occupation, hobbies, and living conditions, and of the onset, duration, and course of the disease, and its response to previous treatment are important. The family history of similar disorders and other related diseases may be useful.

A complete drug history is one of the most important aspects of a thorough history. This includes prescription and over-the-counter medications, supplements, and herbal products. Drug reactions are frequently seen and may simulate many different diseases. Anti-inflammatory agents (steroidal or nonsteroidal), antibiotics, antihypertensives, antiarrhythmics, cholesterol-lowering agents, antiepileptics, and antidepressants may all produce cutaneous disorders. All may simulate entities not usually attributed to drugs. It is equally important to inquire about topical agents that have been applied to the skin and mucous membranes for medicinal or cosmetic purposes, for these agents may cause cutaneous or systemic reactions.

Other illnesses, travel abroad, the patient's environment at home and at work, seasonal occurrences and recurrences of the disease, and the temperature, humidity, and weather exposure of the patient are all important items in a dermatologic history. Habitation in certain parts of the world predisposes to distinctive diseases for that particular geographic locale. San Joaquin Valley fever (coccidioidomycosis), Hansen's disease, leishmaniasis and histoplasmosis are examples. Sexual orientation and practices may be relevant, as in genital ulcer diseases, human immunodeficiency virus (HIV) infection, and infestations (e.g. scabies, pubic lice).

Examination:

Examination should be conducted in a well-lit room. Natural sunlight is the ideal illumination. Fluorescent bulbs that produce wavelengths of light closer to natural sunlight than standard fluorescent bulbs are commercially available.

Abnormalities of melanin pigmentation, e.g. vitiligo and melasma, are more clearly visible under ultraviolet (UV) light. A Wood's light (365 nm) is most commonly used and is also valuable for the diagnosis of some types of tinea capitis, tinea versicolor, and erythrasma.

A magnifying lens is of great value in examining small lesions. It may be necessary to palpate the lesion for firmness and fluctuation; rubbing will elucidate the nature of scales; scraping will reveal the nature of the lesion's base. Pigmented lesions, especially in infants, should be rubbed in an attempt to elicit Darier's sign (whealing), as seen in urti-caria pigmentosa. Dermoscopy is an essential part of the examination of pigmented lesions.

The entire eruption must be seen to evaluate distribution and configuration. This is optimally done by having the patient completely undress and viewing him/her from a distance to take in the whole eruption at once. "Peek-a-boo" examination, by having the patient expose one anatomic area after another while remaining clothed, is not optimal because the examination of the skin will be incomplete and the overall distribution is hard to determine. After the patient is viewed at a distance, individual lesions are examined to identify primary lesions and to determine the evolution of the eruption and the presence of secondary lesions.

Characterization of Identified Lesions

• **Color**: Pink, red, purple white, tan, brown, black, blue,gray, and yellow. The color can be uniform or variegated. (purpuric lesions do not blanch with pressure with a glass slide)

• **Margination :** Well defined (can be traced with the tip of a pencil) or ill defined.

• **Shape** : Round, oval, polygonal, polycyclic, annular (ring-shaped), iris, serpiginous (snakelike) or umbilicated.

Evaluation of Arrangement, Patterns, and Distribution

• **Number** Single or multiple lesions.

• **Arrangement** Multiple lesions may be

(1) ***grouped:*** herpetiform, arciform, annular, reticulated (net-shaped), linear, serpiginous
(2) ***disseminated***: scattered discrete lesions.

• **Confluence** Yes or no.

• **Distribution :** The students have to note the following pints

(1) *extent*: isolated(single lesions), localized, regional, generalized,universal,
(2) *pattern*: symmetric,exposed areas, sites of pressure, intertriginous area, follicular localization,random, following dermatomes or Blaschko lines.

• Palpation :

The points to be considered are as follows
(1) *consistency* (soft, firm,hard, fluctuant, boardlike),
(2) temperature (hot, cold),
(3) *mobility*.
(4)*tenderness*
(5)***depth of the lesion*** (i.e., dermal or subcutaneous).

Hair, nails, and oral mucosa examination

Involvement of hair-bearing areas by certain skin disorders causes characteristic lesions. Discoid lupus causes scarring alopecia with characteristic dyspigmentation. On the skin the lesions may be much less characteristic. Diffuse hair loss may be seen in certain conditions such as acrodermatitis enteropathica.

Some skin disorders cause characteristic changes of the nails, even when the periungual tissue is not involved. The pitting seen in psoriasis and alopecia areata may be useful in confirming these diagnoses when other findings are not characteristic. In addition, the nails and adjacent structures may be the sole site of pathology, as in candidal paronychia.

The complete skin examination includes examination of the oral mucosa. Oral lesions are characteristically found in viral syndromes (exanthems), lichen planus, HIV-associated Kaposi sarcoma, and autoimmune bullous diseases (pemphigus vulgaris)

SPECIAL TECHNIQUES USED IN CLINICAL EXAMINATION:

Magnification with hand lens. To examine lesions for fine morphologic detail, it is necessary to use a magnifying glass (hand lens) (7×).Magnification is especially helpful in the diagnosis of lupus erythematosus (follicular plugging), lichen planus (Wickham striae), basal cell carcinomas (translucence and telangiectasia), and melanoma (subtle changes in color, especially gray or blue); this is best visualized after application of a drop of mineral oil.

Oblique lighting : It is of the skin lesion, done in a darkened room, is often required to detect slight degrees of elevation or depression, and it is useful in the visualization of the surface configuration of lesions and in estimating the extent of the eruption. *Subdued lighting* in the examining room enhances the contrast between circumscribed hypopigmented or hyperpigmented lesions and normal skin.

Wood's lamp examination (ultraviolet long-wave light, "black" light) is valuable in the diagnosis of certain skin and hair diseases and of porphyria. With the Wood lamp (365 nm), fluorescent pigments and subtle color differences of melanin pigmentation can be visualized.The Wood lamp also helps to estimate variation in the lightness of lesions in
relation to the normal skin color in both darkskinned and fair-skinned persons; e.g., the lesions seen in tuberous sclerosis and tinea versicolor are hypomelanotic and are not as white as the lesions seen in vitiligo, which are amelanotic. Circumscribed hypermelanosis, such as a freckle and melasma, is much more evident (darker) under the Wood lamp. By contrast, dermal melanin, as in a Mongolian sacral spot, does not become accentuated under the Wood lamp. Therefore, it is possible to localize the site of melanin by use
of the Wood lamp; *however, this is more difficult or not possible in patients with brown or black skin*. Wood lamp is particularly useful in the detection of the fluorescence of dermatophytosis in the hair shaft (green to yellow) and of erythrasma (coral red). A presumptive diagnosis of porphyria can be made if a pinkish-red fluorescence is demonstrated in urine examined with the Wood lamp; addition of dilute hydrochloric
acid intensifies the fluorescence.
Diascopy*:* It consists of firmly pressing a microscopic slide or a glass spatula over a skin lesion. The examiner will find this procedure of special value in determining whether the red
color of a macule or papule is due to capillary dilatation (erythema) or to extravasation of
blood (purpura) that does not blanch. Diascopy is also useful for the detection of the glassy
yellow-brown appearance of papules in sarcoidosis, tuberculosis of the skin, lymphoma,
and granuloma annulare.
Dermoscopy **(also called *epiluminescence microscopy*):** A hand lens with built-in lighting and a magnification of 10× to 30× is called a *dermatoscope* .It and permits the noninvasive inspection of deeper layers of the epidermis and beyond. This is particularly useful in the distinction of benign and malignant growth patterns in pigmented lesions. *Digital dermoscopy* is particularly useful in the monitoring of pigmented skin lesions because
images are stored electronically and can be retrieved and examined at a later date to permit
comparison quantitatively and qualitatively and to detect changes over time. Digital dermoscopy uses computer image analysis programs that provide (1) objective measurements of changes;(2) rapid storage, retrieval, and transmission of images to experts for further discussion (teledermatology); and (3) extraction of morphologic features for numerical analysis. Dermoscopy and digital dermoscopy require special training

CLINICAL SIGNS

Darier sign :This sign is "positive" when a brown macular or a slightly papular lesion of urticarial pigmentosa (mastocytosis) becomes a palpable wheal after being vigorously rubbed with an instrument such as the blunt end of a pen. The wheal may not appear for 5–10 min.

Auspitz sign : This sign is "positive" when slight scratching or curetting of a scaly lesion reveals punctate bleeding points within the lesion. This suggests psoriasis, but it is not specific.

The *Nikolsky phenomenon* : This sign is positive when the epidermis is dislodged from the dermis by lateral, shearing pressure with a finger, resulting in an erosion. It is an important diagnostic sign in acantholytic disorders such as pemphigus or the staphylococcal scalded skin (SSS) syndrome or epidermonecrotic disorders,such as toxic epidermal necrolysis.

CLINICAL TESTS

Patch testing: It is used to document and validate a diagnosis of allergic contact sensitization and identify the causative agent. Substances to be tested are applied to the skin in shallow cups (Finn chambers), affixed with a tape and left in place for 24–48 h. Contact hypersensitivity will show as a papular vesicular reaction that develops within 48–72 h when the test is read.It is a unique means of in vivo reproduction of disease in diminutive proportions, for sensitization affects all the skin and may therefore be elicited at any cutaneous site.

Photopatch testing: It is a combination of patch testing and UV irradiation of the test site and is used to document photo allergy .

Prick testing: It is used to determine type I allergies.A drop of a solution containing a minute concentration of the allergen is placed on the skin and the skin is pierced through this drop with a needle. Piercing should not go beyond the papillary body. A positive reaction will appear as a wheal within 20 min. The patient has to be under observation for possible anaphylaxis.

Acetowhitening : It facilitates detection of subclinical penile or vulvar warts. Gauze saturated with 5% acetic acid (or white vinegar) is wrapped around the glans penis or used on the cervix and anus. After 5–10 min, the penis or vulva is inspected with a 10× hand lens. Warts appear as small white papules.

LABORATORY TESTS

Microscopic Examination of Scales, Crusts, Serum, and Hair

Gram staining *: Gram stains* of smears and *cultures of exudates and of tissue minces* should be made in lesions suspected of being bacterial or yeast (*Candida albicans*) infections. Ulcers and nodules require a scalpel biopsy in which a wedge of tissue consisting of all three layers of skin is obtained; the biopsy specimen is divided into one-half for histopathology and onehalf for culture. This is minced in a sterile mortar and then cultured for bacteria including typical and atypical mycobacteria) and fungi.

Microscopic examination **for mycelia** .This test should be made of the roofs of vesicles or of scales (the advancing borders are preferable) or of the hair in dermatophytoses. The tissue is cleared with 10–30% KOH and warmed gently. Hyphae and spores will light up by their birefringence .

Fungal cultures:This test is done with Sabouraud medium.

Tzanck smear : This test involves microscopic examination of cells obtained from the base of vesicles and it may reveal the presence of acantholytic cells in the acantholytic diseases (e.g., pemphigus or SSS syndrome) or of giant epithelial cells and multinucleated giant cells (containing 10–12 nuclei) in herpes simplex, herpes zoster, and varicella. Material from the base of a vesicle obtained by *gentle* curettage with a scalpel is smeared on a glass slide, stained with either Giemsa or Wright stain or methylene blue, and examined to determine whether there are acantholytic or giant epithelial cells, which are diagnostic .

In addition, culture, immunofluorescence tests, or polymerase chain reaction for herpes have to be ordered.

Laboratory diagnosis of scabies.:The diagnosis is established by identification of the mite, or ova or feces, in skin scrapings removed from the papules or burrows .Using a sterile scalpel blade on which a drop of sterile mineral oil has been placed, apply oil to the surface of the burrow or papule. Scrape the papule or burrow vigorously to remove the entire top of the papule; tiny flecks of blood will appear in the oil. Transfer the oil to a microscopic slide and examine for mites, ova, and feces. The mites are 0.2–0.4 mm in size and have four pairs of legs .

Biopsy of the Skin

Biopsy of the skin is one of the simplest, most rewarding diagnostic techniques because of the easy accessibility of the skin and the variety of techniques for study of the excised specimen (e.g., histopathology, immunopathology, polymerase chain reaction, and electron microscopy).

Selection of the site of the biopsy is based primarily on the stage of the eruption, and early lesions are usually more typical; this is especially important in vesiculobullous eruptions (e.g.,pemphigus and herpes simplex), in which the lesion should be no more than 24 h old. However, older lesions (2–6 weeks) are often more characteristic in discoid lupus erythematosus.

A common technique for diagnostic biopsy is the use of a 3- to 4-mm punch, a small tubular knife much like a corkscrew, which by rotating movements between the thumb and index finger cuts through the epidermis, dermis, and subcutaneous tissue; the base is cut off with scissors.

If immunofluorescence is indicated (e.g., as in bullous diseases or lupus erythematosus), a special medium called *Michel's medium* for transport to the laboratory is required. For nodules, however, a large wedge should be removed by excision including subcutaneous tissue. Furthermore, when indicated, lesions should be bisected, one-half for histology and the other half sent in a sterile container for bacterial and fungal cultures or in special fixatives or cell culture media, or frozen for immunopathologic examination.

Specimens for light microscopy should be fixed immediately in buffered neutral formalin. A brief but detailed summary of the clinical history and description of the lesions should accompany the specimen.

Biopsy is indicated in *all* skin lesions that are suspected of being neoplasms, in all bullous disorders with immunofluorescence used simultaneously, and in all dermatologic disorders in which a specific diagnosis is not possible by clinical examination alone.

Ci-AB PS session Dermatology 1

Duration
2 hours

Structure
60 min: Case 1
60 min: Case 2

Learning outcome
Students are able to inspect and describe various general skin characteristics systematically. Students are also able to describe the treatment of the skin disorder systematically.

Student tasks
Preparation
Students have to read the study material from the prescribed text. Students are assumed to have the knowledge of the ***diagnosis, differential diagnosis and the treatment*** of the case being discussed.

Work up the doctor's role for the CiA part of Cases 1 and 2. The students who have been assigned the patient role prepare for their role in this section. In the second part of the case (the CiB part), they play the role of doctor.

At the session
Participating in role-play and reflecting and receiving feedback on this, participating in the post-mortem discussion, practising dermatological skills.

Study material

1) ***Student Manual***
2) ***Fitzpatrick's color Atlas and Synopsis of Clinical Dermatology,7th edition by Klaus Wolff)***

Additional reading:

Background information can also be obtained from DOIT (Dermatology Online with Interactive Technology) on www.cyberderm.net, an interactive, systematic, problem-centred online dermatology programme.

Appendix 1

Assignment

The students have to work up the doctor's role for cases 1 and 2. Each student will take each of the three roles: doctor, patient and observer. The students have to prepare the questions he/she intends to ask to identify the main health issue and for obtaining specific history. In Dermatology students are allowed to inspect the skin disorder before testing their hypothesis. The students also ask specific questions before testing their hypothesis .The students can also ask specific questions after inspecting the skin lesion to arrive at a diagnosis. Finally the students have to arrive at a differential diagnosis and also formulate a list of possible abnormalities they would expect to find in physical examination .

The student who performed the patient role conducts the treatment consultation. This student has to prepare well for communicating clearly the diagnosis and treatment to the patient ,during the discussion .The treatment discussion should start with the summary of the case history and it has to be based on the diagnosis reached .The 6 step model should be followed in the treatment consultation.

The student can prepare the treatment recommendation using information from their reference book.

(Fitzpatrick's color Atlas and Synopsis of Clinical Dermatology,7th edition by Klaus Wolff,
Section 2 : Eczema/dermatitis : pages 18-48 and
Section 3 : Psoriasis and psoriasiform dermatitis: page 49-72)

Case 1
A mother takes her 6-year-old son to the dermatology outpatient clinic. She is worried, as he has itchy skin patches that do not respond satisfactorily to the ointment she puts on them. The child scratches on the itchy patches severely and the child is unable to sleep well at night due to these symptoms. The mother is tense due to these symptoms.

Assignment
You are an intern in the Dermatology Department. What do you need to know so as to make a correct diagnosis? Ask about progression and current treatment; come up with questions to differentiate between the various causes of eczema and obtain any other information you need.

Reference textbook:

1) **Student Manual**
2) **Fitzpatrick's color Atlas and Synopsis of Clinical Dermatology, 7th edition by Klaus Wolff, Section 2: Eczema/ dermatitis : pages 18-48**

Additional information for Case 1

1. *British Association of Dermatologists, http://www.bad.org.uk .Primary Care Dermatology Society & British Association of Dermatologists. Guidelines on the management of atopic eczema*
2. *Section : 1 Diagnosis and assessment of atopic dermatitis. JAAD: 2014;Vol 70:338-351*
3. *Section : 2 Guidelines of care for management of atopic dermatitis .Management and treatment of atopic dermatitis with topic therapies .JAAD: 2014;Vol 71:116-132*
4. *Section : 3 Guidelines of care for management of atopic dermatitis .Management and treatment of atopic dermatitis with phototherapy and systemic agents JAAD 2014;71:327-349.*

Case 2

A 35 year old woman presented to the dermatology outpatient clinic with complaints of reddish scaly asymptomatic raised lesions over the elbows and the knees since 5 months .She also had complaints of joint pain involving the small joints of the hands. She also complains of severe dandruff in the scalp, which is not reducing with usual antidandruff shampoos. The complaints are severe during winter. The patient also has yellowish discoloration of nails.

Assignment

You are an intern in the dermatology department .What do you need to know in order to make a correct diagnosis? Ask about progression and current treatment? Come out with questions to differentiate the various types of psoriasis and to also understand the complications and latest treatment available for psoriasis. Also know about the prognosis of psoriasis and obtain any other information you may need

Reference text book:

1) **Student Manual**
2) **Fitzpatrick's color Atlas and Synopsis of Clinical Dermatology, 7th edition by Klaus Wolff, Section 3: Psoriasis and psoriasiform dermatitis: page 49-72**

Additional reading:

AAD guidelines for treatment of psoriasis JAAD 2008;vol 58:pages 826-864

AAD guidelines for treatment of psoriasis JAAD 2009;vol 60:pages 643-659

AAD guidelines for treatment of psoriasis JAAD 2009;vol 61:pages 451-485

AAD guidelines for treatment of psoriasis JAAD 2010;vol 62:pages 114-135

AAD guidelines for treatment of psoriasis JAAD 2011;vol 65:pages 137-174

Dermatology CiA-CiB –PS 2

Duration
2 hours

Structure
60 min: Case 1
60 min: Case 2

Learning outcome
Students are able to inspect and describe various general skin characteristics systematically. Students are also able to describe the treatment of the skin disorder systematically.

Student tasks
Preparation
Students have to read the study material from the prescribed text. Students are assumed to have the knowledge of the diagnosis, differential diagnosis and the treatment of the case being discussed.

Work up the doctor's role for the CiA part of Cases 1 and 2. The students who have been assigned the patient role prepare for their role in this section. In the second part of the case (the CiB part), they play the role of doctor.

At the session
Participating in role-play and reflecting and receiving feedback on this, participating in the postmortem discussion, practising dermatological skills.

Study material
1) **Student Manual**
2) ***Fitzpatrick's color Atlas and Synopsis of Clinical Dermatology,7th edition by Klaus Wolff – Section 17: Pigmentary disorders .pages 284-301***

Appendix 1

Assignment

Work up the doctor's role for Cases 1 and 2. Each student will take each of the three roles: doctor, patient and observer. Prepare the questions you intend to ask to identify the main health issue and for the specific history. In Dermatology you are allowed to inspect the skin disorder before testing your hypothesis. What questions do you intend to ask to test your hypothesis? Draw up a DD and list possible abnormalities that you would expect to find in the physical examination. The student who has prepared for the patient role conducts the treatment discussion. Think about communicating clearly when conducting the discussion. Remember as a doctor that this is the last phase of the consultation: detailed history-taking has already been done by this stage. Begin the treatment discussion with a summary of the case history (see Case) and base it on the diagnosis reached. Follow the 6-Step model in your treatment consultation.

Prepare your treatment recommendation using the information you now have at your disposal. Write a prescription if appropriate.

Work up the case on the 6-Step form and take it to the session.

Case 1, White patches

A 32-year old woman came to dermatology outpatient clinic with whitish asymptomatic patches, over the face and the dorsa of both hands, since 5months. She also complains of newly appearing patches over the abdominal scar since 1 month.

Assignment
You are an intern in the dermatology department receiving the patient.
What do you want to know from the patient, to make a correct diagnosis? Ask about progression and current treatment. Come up with questions to differentiate between various types of white lesions in the skin. Also know about prognosis and latest treatment options in the therapy of this condition and obtain any information you need.

Case 2

A 49-year-old man presents at the GP surgery. He has a skin-coloured lump on his forehead which is growing in recent months and on which a recurring crust has formed that refuses to heal.

Assignment
You are an intern in a GP practice. What do you want to know and why? What factors make it likely that this patient has a type of skin cancer?

Students are expected to read about the etiology, pathogenesis, diagnosis and treatment of Basal cell carcinoma and its differential diagnosis Squamous cell carcinoma, malignant melanoma and its precursor lesions (premalignant lesions) from the prescribed text given below

References:

1) **Student manual**
2) **Fitzpatrick's color Atlas and Synopsis of Clinical Dermatology,7th edition by Klaus Wolff,**
   Section 10: Actinic keratosis : pages 219-222
   Section 11: Precancerous Lesions and Cutaneous Carcinomas : pages 226-251
   Section 12: Melanoma precursors and Primary Cutaneous Melanomas: pages 252-283

Additional information for Case 2

- Information can be found on the websites http://www.aad.org .Open the website and click on the link ***'for dermatologists'***.Then click on the link '***education and quality care'***. Select the option '***Basic dermatology curriculum'***.kindly click on link '***learning module'*** and read the module ***'Basal cell carcinoma'*** **&** ***'Actinic keratosis and squamous cell carcinoma'*** power point.
- *Kindly read the BAD article* ***'Guidelines for management of basal cell carcinoma'*** from British Journal of Dermatology 2008:Volume159:pages 35-48
- *Kindly read the BAD guidelines* ***'Multiprofessional Guidelines for management of patient with Primary Cutaneous Squamous cell carcinoma'***

CiAB PS Session Allergy

Duration
2 hours

Structure
15 min: Socratic questioning
15 min: Allergy testing
45 min: Case 1
45 min: Case 2

Learning outcome
Students are able to take a history, pose questions to test their hypotheses and draw up a differential diagnosis.
Students are able to formulate any abnormal findings from physical examination.
Students are able to conduct a treatment/strategy discussion based on a diagnosis, using the 6-Step model.
Students are able to apply the 6-Step model and write a prescription.

Student tasks
Preparation
Study the study material.
Students are assumed to have the knowledge they gained in the first 3 years. *The study material also includes the diagnoses in the differential diagnosis.*
Work up the doctor's role for the CiA part of Cases 1 and 2. The students who have been assigned the patient role prepare their roles for these cases. In the second part of the case (the CiB part) they play the role of doctor.
At the session
Participating in Socratic questioning, allergy testing,role-play and reflecting and receiving feedback on this.

Study material

- *Fitzpatrick's color Atlas and Synopsis of Clinical Dermatology,7th edition by Klaus Wolff, Section 14: Skin in Immune, Autoimmune and Rheumatic disorders : Topic - Urticaria and Angioedema: pages 306-314*
  Section 14: Skin in Immune, Autoimmune and Rheumatic disorders :Topic-Urticarial vasculitis: pages - 363-364

- Information can be found on the websites http://www.aad.org .Open the website and click on the link ***'for dermatologists'***.Then click on the link '***education and quality care'***. Select the option '***Basic dermatology curriculum'***.kindly click on link '***learning module'*** and read the module '***Urticaria***' power point.

Appendix 1
Diagnosing Allergy

Case history
Taking an allergy history is an extensive and time-consuming process. Initially, the patient's main symptoms are investigated in detail. In the case of atopic patients, this involves all organs that come into contact with the environment (eyes, upper and lower respiratory tract and the skin). The review of systems can usually be relatively brief.

The main symptoms must be discussed extensively, including their progression, both in time and in space. The questions must always include 'where', 'what' and 'how'. Of course, the patient's history up to the present must be reviewed and particularly the extent to which earlier treatments have relieved the symptoms in the past. Because environmental allergens may be involved, the history must not only include the patient but also the wider context (housing situation, occupation, hobbies and so on).

After the initial discussion of the main symptoms, which must also include giving the patient the opportunity to make a personal interpretation of these symptoms, the physician must take the lead and inquire into various specific symptoms by means of yes/no questions. The following symptoms are relevant in this context:

- Eyes: redness, itching, tears, ecchymosis, vision
- Nose: air passage, itching, rhinorrhea, sneezing fits
- Pharynx: itching, dysphagia, globus sensation, sore throat
- Lower respiratory tract: (fits of) dyspnoea, nocturnal dyspnoea, wheezing, coughing, sputum expectoration, exercise intolerance, hyperventilation symptoms
- Skin: itching, redness, swelling, papules, pustules, urticaria, scaling
- Syncope, anaphylactic reactions
- If indicated: gastrointestinal symptoms and joint problems
- If indicated: malaise, exercise intolerance, hyperventilation, fatigue

Once all symptoms have been identified, their causes are investigated. Good questions for pinpointing cause-and-effect relationships are 'Does the season play a role?' and 'Do these symptoms change during the holidays or when you are away from home?' Possible non-allergic causes – infection, hyperreactive stimuli (fog, cigarette smoke, airborne chemicals) in the case of airway symptoms; irritants such as water, detergents etc. in the case of eczema; and pressure, heat or other physical stimuli in the case of urticaria – must also be investigated. Detailed questions must be asked about the housing situation (construction, humidity, flooring, pets, smoking in the house). Secondary characteristics giving an impression of the severity of the illness are also important. If a child is involved, therefore, questions must be asked about growth and development, sleeping disorders, learning and playing. If the patient is an adult, the social history is important. If indicated, the occupational history must be examined in detail (nature of current and previous jobs, if any). Direct and indirect clues pointing to an occupational origin must be investigated and the patient should also be asked whether colleagues have the same complaints.

In view of the hereditary nature of atopy, the history of first-degree relatives must also be checked.

Patients are often not used to reviewing their symptoms in a systematic way. In such cases it is often useful to provide a brief explanation of the causes of allergic reactions and to briefly review the patient's history during follow-up consultations. It is also wise to ask patients what they think the outcome of the consultation will be. In other words, what is their care request? This may seem to be asking the obvious but again and again it appears that this simple question is extremely useful because patients and health professionals sometimes have very different ideas about the patient's reasons for making an appointment. If the physician knows the care request, he will not give answers that the patient does not need and he will ensure that the patient's questions do not remain unanswered. The question may also be useful to put any unrealistic expectations the patient may have into perspective.

Physical examination
The physical examination consists of a general examination supplemented with specific items for inspection. The physician should check whether the patient displays symptoms that are consistent with allergy or due to other conditions.

Special attention must be paid to:
- Scalp and face (eczema)
- Eyes
  Are there any signs of (allergic) conjunctivitis, possibly with chemosis; are there papillae on the conjunctiva? Are there any characteristic abnormalities visible that are consistent with atopy, such as folds under the eyes (Dennie-Morgan lines) or blue circles under the eyes (allergy shiners)? The latter are caused by hyperaemia of the paranasal sinuses.
- Nose
  Does the patient have rhinorrhea, how does the mucosa appear, is the air passage impeded by polyps or structural defects; is a distinct transverse fold visible across the nose, caused by repeatedly wiping the tip of the nose (‘allergic greeting’), are there any signs of sinusitis?
- Pharynx
  Is there angioedema? Is the uvula enlarged? (can be consistent with this). How does the mucosa appear, are there any indications of tonsillitis? Is there geographic tongue? (can be a chronic symptom in the case of atopy).
- Neck
  Is there any significant lymphadenopathy, suggesting any lymphomas; are there any abnormalities palpable in the thyroid gland? (urticaria and bouts of angioedema can occur in both hyperthyroidism and hypothyroidism).
- Thorax
- Is there dyspnoea? Is it accompanied by wheezing and/or prolonged expiration, crepitation or heart murmurs?
- The abdomen is usually examined only if indicated, for example if food allergy is suspected.
- Skin: urticaria, angioedema: predilection sites for eczema, depending on age (examine the cubital folds, popliteal folds, face and hands separately; blisters, redness, scaling)
- Children: check height and weight! In the case of atopy it is important to monitor the growth curve.

Allergy testing
Specific allergy testing shows whether the patient is sensitized to allergens, but it should be realized that sensitization does not necessarily cause symptoms (and therefore allergy). Screening shows that approximately 20% of individuals sensitized to normal inhaled allergens do not have any symptoms. The situation is similar with sensitization to food allergens. This is referred to as ‘asymptomatic sensitization’: IgE to certain allergens is found without any allergy symptoms. What causes this phenomenon is not completely clear but several factors have been identified that determine or influence whether a person will develop allergic symptoms. As far as the airways are concerned, it is clear that the extent of bronchial hyper-reactivity is important. Obviously, the degree of exposure to the allergen concerned and its IgE serum level also play a role.Food allergy research has shown that other factors are also involved. IgE specific to various sugar antigens, for example, does not lead to symptoms because the epitopes concerned are too small to bridge two IgE molecules on the surface of a mast cell. What is not understood yet is why sensitization to allergen A is completely asymptomatic in one individual while another person with the same level of IgE specific to A will develop serious reactions. Exactly the opposite, however, may occur with allergen B.

The above illustrates that sensitization must always be interpreted in the light of the patient’s history and this requires knowledge of allergen sources.

Skin tests and IgE-specific (type I) tests
Skin tests are the first clinical tests for sensitization. A skin test involves injecting a small amount of allergen into the skin. Any maintenance treatment (antihistamines) must be discontinued. As it is an in vivo test there is always a small risk of an anaphylactic reaction.

A specific IgE test (RAST) is carried out only if indicated. This is an in vitro test where the serum being examined is incubated with an allergen coupled to an allergosorbent (a solid matrix), and any allergen-specific IgE present is bound to the solid matrix. Once any non-bound serum components have been removed, the sample is incubated with radioactively marked antibodies to IgE. The amount of radioactivity on the solid matrix is a measure of the amount of allergen-specific IgE.

The IgE antibody levels are shown as:

-	Serum contains less than 0.35 IU specific IgE per ml (negative)
+	0.35 - 1 IU/ml
++	1 - 3 IU/ml
+++	3 - 9 IU/ml
++++	9 - 27 IU/ml
+++++	Allergen-specific IgE > 27 IU/ml (highly positive)

The results of IgE tests are usually expressed in terms of classes. These classes also correspond closely to the seriousness of the symptoms. 'Multi tests' (formerly known as 'Phadiatop') are an important additional tool: these too are in vitro tests. As part of such a test, various allergens are linked to a carrier, for example a mixture of inhaled allergens. A negative result will almost certainly exclude sensitization to one of the allergens tested. If the result is positive, relevant allergens from the same blood sample can be tested separately.

Initially, the tests will be exploratory in nature and depend on the patient's age. In the case of young children, tests to determine sensitization to food and/or inhaled allergens are usually sufficient. Skin tests and specific IgE tests can be done at any age, although sensitization patterns are age-dependent. At a young age (up to three years) sensitization to inhaled allergens is rare, while sensitization to several atopic food allergens is more common. Such a sensitization pattern not only identifies a potential causative agent but will also show that the patient has taken the first steps of the atopic march.

(Note: Atopic march is often used to describe the progression from atopic dermatitis to other allergic diseases like asthma and allergic rhinitis ie atopic dermatitis precedes all other allergic disease) (*Allergy 69(2014)17-27*.)

The choice between skin tests, blood tests and a combination of the two is not a fundamental one. The advantage of skin tests versus testing specific IgE is that the result is immediately available, which will be informative to the patient. A disadvantage of skin tests is that they cannot be done if the skin is highly active (eczema) or if the patient uses certain drugs such as antihistamines. An increased total IgE level and eosinophilia also point to atopy but are less specific, as these are also elevated in the event of parasitic infections and other conditions.

Patch tests (type IV)
If allergic contact eczema is suspected, patch tests are done. Such tests can also be useful for diagnosing allergic reactions to drugs (type IV). Simply applying substances to the skin without experience and/or doing a literature survey is not advisable, because there are many substances that irritate the skin and cause non-specific (toxic) reactions. Patch tests require an intact skin area free from eczema and other conditions. Corticosteroids and other immunosuppressants administered locally or systemically may inhibit the skin response. A positive patch test does not necessarily mean that the reactive substance is the cause of the patient's symptoms. The implementation and interpretation of skin tests (intracutaneous, epicutaneous and/or patch tests) requires specialist knowledge.

Caution: A negative result for a drug in a test that does not have a documented predictive value has no meaning, and under no circumstances should the physician regard it as carte blanche to prescribe the drug in question without risk.

Other laboratory tests
A type I allergic reaction is accompanied by the production of mast cell mediators such as histamine and tryptase. The latter can be measured directly in the blood. Serum histamine levels cannot be measured reliably but elevated levels of histamine metabolites can be measured in the urine approximately one hour

after an anaphylactic reaction. These levels are permanently increased in mastocytosis patients. Activity of atopic allergy is often reflected in increased numbers of eosinophil granulocytes in the circulation too.

In the case of gastrointestinal symptoms and particularly growth disorders in children, tests for resorption disorders, digestion and intestinal parasites should be done. If gluten-sensitive enteropathy is suspected, gluten-specific IgG and IgA and anti-endomysium and transglutaminase antibody levels will be measured, if necessary followed by a jejunal biopsy. If immune deficiencies are suspected, immune status tests must be done. To exclude cystic fibrosis in patients with chronic respiratory and/or gastrointestinal symptoms, a sweat test must be done. Various IgG assays may be done to determine other than type I and type IV allergies (e.g. allergic alveolitis). In the case of recurrent or familial angioedema, serum C1 esterase, C3 and C4 must be measured. The physician should also be open to the possibility of systemic or haematological diseases. Depending on the differential diagnosis, renal and hepatic function, faeces and/or urine, immunoglobulin, haematological, autoantibody and other tests may be in order.

Functional assessment and imaging

Particularly with food allergies and some forms of drug allergies, allergy tests do not have sufficient predictive value. In that case, a **provocation test** will be done if the procedure is considered safe. The patient will first be given a low dose of the substance which is the suspected causative agent. Preferably, the testing should be double-blind.

In addition to specific allergy tests, functional assessment of the affected organs will usually also take place, for example pulmonary function tests or nasal provocation tests. In the case of urticaria, physical tests may be done. Particularly when patients develop symptoms later in life, imaging techniques (X-ray, scanning, if necessary endoscopy) may be used to exclude other causes than an allergy.

Diagnosis
Once the results of the history-taking, physical examination and lab tests are known, the physician will try to make the diagnosis. The diagnosis should always be worded as a specific pathology (asthma, allergic rhinoconjunctivitis, eczema, etc.). This is the clinical or pathological diagnosis. The use of pathological terminology also has the advantage that preventive therapy can be initiated even if the specific cause of the hypersensitivity is not found, for example in the case of anaphylaxis. It goes without saying that the physician should always try to make a **causal diagnosis** as well as the **clinical diagnosis**. The complete diagnosis could then be, for example: *anaphylactic shock with short-term unconsciousness* (clinical diagnosis) *due to eating squid* (causal diagnosis). Another example: *fully reversible allergic asthma with slight bronchial hyperreactivity* (clinical diagnosis), *strong allergy to cats and house dust mite* (causal diagnosis).

The treatment of allergic patients does not usually take the form of crisis intervention but of long-term care of chronic patients. It will take time and sympathy to help patients accept their illness, take appropriate sanitation measures and get used to long-term medication. But the benefits are great – a life that is almost or completely normal.

Specific pathologies
Anaphylaxis
The key element in anaphylaxis is generalized mast cell degranulation.
Anaphylaxis is not always an allergic (IgE) reaction in the purest sense of the word. It may also be caused by a pharmacological or physical factor. Pharmacological causes include NSAIDs, which may cause a change in prostaglandin metabolism in sensitive individuals. Physical factors include temperature (either hot or cold) and exertion (incidentally, it is possible that NSAIDs also cause a true immunological response: IgE binding).

Another form of non-immunologically induced anaphylaxis can occur after infusion of X-ray contrast medium or during apheresis. The degranulation of mediator cells that takes place in these instances seems to be caused mainly by osmotic or mechanical changes in the vicinity of these cells. Finally, it is also possible that IgE-specific IgG antibody is responsible for the degranulation.

It is important to know the details of the mechanism underlying the acute reaction because this may have a bearing on diagnostics and treatment.

Clinically, anaphylaxis has been associated with:
- Insect stings or bites
- Drugs
- Foods
- Contact of skin or mucous membranes with latex and other substances
- Aeroallergens (desensitization injections!)
- X-ray contract medium infusion and apheresis
- Physical exertion, possibly combined with specific foods
- Temperature changes

Anaphylaxis is often accompanied by a complex of symptoms including one or more of the following in combination with hypotension: redness, itching (characteristic sites are palms and foot soles), acute urticaria, angioedema, gastrointestinal symptoms, dizziness, blurred vision, tachycardia and bronchial obstruction.

The history-taking of anaphylaxis patients should focus on determining whether the reaction was indeed anaphylactic and thus excluding other causes of a syncoptic episode. A clinical presentation that is characteristic of anaphylaxis will help to make the diagnosis, which is supported by a rapid pulse and low blood pressure. If the pulse is slow after a syncoptic episode and the patient is pale and sweaty, a vasovagal episode is more likely. Cramps, a tingling sensation around the mouth and in the digits and shortness of breath may point to hyperventilation. Of course, dyspnoea is a symptom of anaphylaxis if it is accompanied by bronchial obstruction and/or oedema of the upper respiratory tract. The presence of a precipitating factor such as an insect sting, consumption of particular foods or medication must be excluded. If patients mention some such precipitating factor, questions must be asked about past experiences, in other words, have they come into contact with it before and what were their reactions and symptoms then, if any? Also relevant is whether the patient has ever had a similar reaction without coming into contact with this factor. The patient must always be asked whether this past reaction has been objectively diagnosed as anaphylaxis through blood pressure measurements and examination by a nurse or physician, and what the treatment was. Anaphylactic reactions are more common among atopic individuals (at least for some allergens). The individual and familial history-taking should thus focus on the presence of asthma, hay fever or eczema. The physician must always take into account that an anaphylactic reaction is a traumatic experience. It is therefore necessary to pay sufficient attention to the way in which patients experienced the episode and how they feel about the chance of recurrence and other relevant issues.

Patients must also be asked to provide details about all episodes of acute anaphylaxis they can remember: the circumstances under which the attack occurred, the month, the week, the day, site of occurrence (at home or elsewhere), influence of occupational activities, food consumed or medication used. Particularly where food and medication are concerned, patients must be asked to recollect the 12 hours preceding the episode. This is particularly important to clarify the context in which the reaction took place but should not give the patient the impression that anaphylaxis can occur 12 hours after eating certain foods or taking certain drugs because this period is usually limited to a few hours, except in the case of NSAIDs and ACE inhibitors. Other factors such as physical exertion, temperature (either hot or cold), insect stings and possibly vaccinations, and signs of infection can also play a role.

When discussing medication, NSAIDs, beta-blockers, opiates and antibiotics must be mentioned in particular. Specific attention must be paid to well-known triggers such as foods (peanuts, other nuts, shellfish, etc.), contact allergens such as latex and occupational allergens.

Supplementary data include the medical history, particularly the presence of atopy, systemic diseases, use of medication, vasovagal or hyperventilation episodes and indications of arrhythmias and neurological disorders.
If the reaction is still going on, the physical examination should focus on urticaria, angioedema and any other symptoms that may be caused by mediator release such as bronchial obstruction, gastrointestinal symptoms and so on. If the reaction is no longer present, the examination should focus on indications for atopic syndrome (asthma, eczema, rhinitis, conjunctivitis, eczema, dermatographism), urticaria pigmentosa, signs of internal pathologies such as swollen glands, thyroid pathologies, joint problems, abdominal symptoms (liver, spleen) and the oropharynx.

Lab tests are indicated to determine the specific stimuli that could have triggered the anaphylactic reaction, to confirm or exclude anaphylaxis, and to identify factors that could complicate future diagnostics and treatment. To recognize the immediate triggers of the reaction, a two-track policy is used. On the one hand, tests will be done to identify specific factors suspected on the basis of the history, for example skin tests for medication and/or food ingredients. A specific IgE test may be requested if indicated. On the other hand, screening for inhaled allergens – to determine the atopy status – and food allergens should also be done to identify any factors not recognized by the patient. If food allergens are suspected, provocation tests will usually be conducted. Often, a dietician is called in to help clarify the diagnosis concerning food ingredients and possibly make additional treatment recommendations. If an anaphylactic reaction to a drug is suspected, skin and/or provocation tests may be done in a limited number of cases. If physical factors such as Temperature (either hot or cold) or physical exertion seem likely causes, the diagnosis may be supported with skin tests or exercise testing.

All patients referred for further testing for anaphylaxis should be screened for mastocytosis (proliferation of mast cells). Urine histamine metabolites and/or serum tryptase are useful tests in this context. If the level of one of these factors remains high, a bone marrow puncture must be done to exclude systemic mastocytosis.

Treatment of anaphylaxis
The degree of success of anaphylaxis treatment is closely related to the time it takes to recognize the condition. Various studies have shown a correlation between survival and the period between the onset of the reaction and the administration of adrenaline. Generally, lower doses of adrenaline will be given than are used during resuscitation. Adults are usually given **0.3 ml of adrenaline=epinephrine (1:1000) intramuscularly**. Based on heart rate and clinical presentation (no arrhythmias), 0.1 ml adrenaline dissolved in 10 ml of saline solution may also be given. The dosage for children is 0.1 ml (1:1000) per 10 kg body weight intramuscularly. In the clinic but also in the ambulance, a fast-running IV infusion must be placed for **rapid intravenous filling**. If anaphylaxis is quickly recognized and treated in good time, plasma expanders are usually not indicated because in that case the interval of hypotension is brief. It is even preferable not to use such products because they themselves may lead to the release of histamine. An H1 histamine antagonist will always be given, for example **2 mg of clemastine IV** in adults or 1 mg IV in children.

To prevent subsequent complications, most protocols also recommend a corticosteroid, for example **50 mg of prednisolone** (children 25 mg) IM or IV. Megadoses of corticosteroids are not indicated for anaphylaxis. If the larynx and/or glottis are oedematous, adrenaline may be given locally per spray; in the event of bronchoconstriction, a beta-2 mimetic. Obviously, it may be necessary to intubate the patient and admit him to the ICU but experience has shown that quick recognition of the condition will usually make such measures unnecessary. Patients presenting to the A&E ward must be observed for several hours after successful treatment. The risk of a late reaction is very low if no complications develop and the standard treatment with antihistamines, adrenaline and corticosteroids was given. High-risk patients (severe asthma, mastocytosis, beta-blocker use) should preferably be observed for a longer period, for example 24 hours.

Preventive treatment

To offer optimum prevention, it is necessary to identify the cause of the anaphylaxis. In the majority of cases, careful history-taking followed by skin and/or lab tests will lead to the cause being identified. As soon as the cause has been identified, a policy must be formulated to minimize contacts with the causative agent. If a drug is the cause, an alternative must be prescribed and the patient's GP must be notified. In some cases (X-ray contrast media) a treatment with antihistamines and corticosteroids preceding future X-rays may prevent recurrence of the anaphylaxis. If the patient is hypersensitive to food ingredients, a dietician may provide lists of ingredients in food products. If future contacts with food ingredients cannot be ruled out, the patient must be given an EpiPen (an epinephrine autoinjector). The preventive management of hypersensitivity to insect stings consists of hyposensitization or providing patients with an EpiPen. Hyposensitization may also offer protection against hypersensitivity to inhaled allergens but this treatment is less effective than insect venom therapy. Because the large number of subcutaneous injections makes immunotherapy a stressful type of treatment, alternative modes of administration are being researched. Sublingual administration (under the tongue) is one alternative but it is not clear yet whether this will lead to equally successful results.

Unlike the hyposensitization to wasp venom or inhalation allergens described above, which create long-lasting or even permanent immunity, there are also forms of '*desensitization*' that are only active as long as the treatment is given. This is the case, for example, with patients who take NSAIDs and cannot do without them (e.g. because they have rheumatoid arthritis). They become slowly desensitized. In patients who are hypersensitive to insulin or penicillin, tolerance can be induced quickly by means of rush hyposensitization. This treatment starts with a very low dose, after which increasingly larger doses are administered at a regular interval (of e.g. 30 minutes) until after several hours the therapeutic dose is reached. This creates lasting immunity in some cases but the protection usually disappears after the drug hasn't been used for some length of time.

Finally, it is recommended that some patients who have had a severe allergic reaction carry a medical alert card or wear a medical alert bracelet.

Appendix 2

Physical Examination for Allergy Observation List

Prior to the examination
Greet the patient.
Explain the examination and the reason for it.
Undressing instructions: uncover upper body
Position: semi-incumbent on examination table
Ensure privacy.
Remove jewellery, wash hands.

General
When inspecting pay attention to:
- shortness of breath
- colour
- facial angioedema
- syncope

Measure heart rate and blood pressure.

Skin
Inspection: pay attention to:
- dryness, effects of scratching, redness, pallor, scaling, pigmentation
- eczema (pay attention to the predilection sites for eczema, depending on age: examine the cubital folds, popliteal folds, face and hands separately)
- swellings, papules, pustules, urticaria, angioedema
- scars

Eyes
When inspecting pay attention to:
- symmetry; discharges: tears, pus, swellings
- Dennie-Morgan lines
- signs of conjunctivitis, itching, redness, swelling, chemosis
- papillae in the medial canthus of the lower eyelid

Nose
When inspecting pay attention to:
- symmetry; transverse fold (‘allergic greeting’); discharges: rhinorrhea
- Assess nasal mucosa, colour, swelling, polyps
- Palpate bony nasal skeleton
- Check the nasal air passage
- Palpate and percuss the sinuses: throbbing pain

Pharynx
When inspecting pay attention to:
- lips: swelling
- mucosa: swelling, coating (Candida)
- tongue: enlargement, dental impression
- teeth: caries
- tonsils: enlargement
- posterior wall of oropharynx: enlargement of uvula

Neck
- Palpate the lymph nodes in the head and neck.
- Palpate the thyroid gland.

Thorax

- Brief general inspection, paying attention to: shape/movement of thorax, shallow inhalations, fast respiratory rate
- Lung auscultation, paying attention to: prolonged expiration, adventitious sounds (rhonchi, crepitations)
- Heart auscultation, pay attention to: murmurs

Extremities

When inspecting pay attention to:

- deformities, clubbed fingers, watch-glass nails
- purpura
- onychomycosis

During the examination

Explanation during the examination
Give instructions on position
Close observation
Eye etc. contact with the patient
Communicate well and use the correct techniques

After the examination

Announce that the examination is over
Give dressing instructions.
Conclusion
Wash hands, discuss findings with patient

Appendix 3

Assignment

Work up the doctor's role for Cases 1 and 2. Prepare the questions you intend to ask to identify the main health issue and for the specific history. What questions do you intend to ask to test your hypothesis? Draw up a DD and list possible abnormalities that you would expect to find in the physical examination. The student who has prepared for the patient role conducts the treatment discussion. Think about communicating clearly when conducting the discussion. Remember as a doctor that this is the last phase of the consultation: detailed history-taking has already been done by this stage. Begin the treatment discussion with a summary of the case history (see Case) and base it on the diagnosis reached. Follow the 6-Step model in your treatment consultation.

Prepare your treatment recommendation using the information you now have at your disposal. Write a prescription if appropriate..

Work up the case on the 6-Step form and take it to the session.

Case 1

Patient card

Mrs Sara **Hofuf** **Age 30** **Sex: female**

HISTORY - Had asthma as a child and hay fever as an adolescent. - Recurring non-specific back pain for past two years.

Setting: You are a locum GP working for the weekend shift at a polyclinic in surgery department .

Reason for making appointment/main health issue: Rash with intense itching all over the body, since 3 days and momentary failure to respond when spoken to

Assignment: You take the patient's case history and consider what physical examination you would like to carry out.

Case 2

Patient card

Mrs Dua Ali
Dammam
Age 45 years
Sex: female

MEDICAL HISTORY
- G2 P2
- Heavy menstruation five years ago, possibly due to myoma

MEDICATION
- Microgynon 30 (Ethinyl estradiol and levonorgestel)

Setting
You are a locum standing in for GP. You are free at the OPD when your assistant asks whether you can see Mrs Dua Ali, who has dropped in there at the clinic with an acute problem. You agree, to see her as the next patient .

Assignment
You take the patient's case history again in detail and consider what physical examination you would like to carry out. The CTC teacher gives you the findings from the physical examination. If you would like to discuss treatment with the supervisor you can say so.

CC Session Skin Problems

Type
Complete consultation session with **simulation patients**

Duration
Session: 3 hours

Learning outcome
Students are able to conduct a complete consultation with a simulated patient. **All the phases** of the consultation should be dealt with.

Student tasks
Preparation
Study the study material. Students are assumed to have the knowledge they gained in the first 3 years. Study the checklists so far.

Three students conduct a consultation with a simulation patient. Prepare for this. Take all the equipment you need with you, e.g. a stethoscope. Dress appropriately. Introduce yourself to the simulation patient. As regards subject matter, you are expected to have prepared by knowing the required skills such as history-taking and physical examination. You should also be able to put forward a proposal on treatment strategy in the context of the week's theme.

In Dermatology you are allowed to inspect the skin disorder before testing your hypothesis.

At the session
Active participation in the CC session: in the role of intern conducting the consultation, and as a listener giving feedback.

Study material
Study the material from previous Ci and PS sessions.

Equipment to be taken along by students
Reflex hammer
Stethoscope
Penlight
Magnifying glass
Glass slide
Measuring tape

Appendices
1. Feedback list for the CC session

Appendix 1

Feedback list for the CC session

The teacher (playing the doctor) follows the following steps in the order shown in each consultation:

1. The student doctor lists the learning points mentioned after previous consultations.
2. The consultation takes place.
3. The student comments on how he has conducted the consultation and lists the aspects on which he would like feedback.
4. Feedback from the simulation patient
5. Feedback from the student observers. The teacher asks the students who observed to respond.
6. If so desired: the student responds to the feedback at 5 and 6.
7. Feedback from the teacher
8. The student formulates learning points.

King Faisal University

Medicine Student Manual

Academic year 2017-2018

Week – Cardiac and respiratory problems

PS Session Pathological Heart Sounds

Group size
Full group

Duration
2 hours

Learning outcome
Students are able to recognize the auscultatory characteristics of the various physiological and pathological heart sounds and murmurs, in particular normal heart sounds, aortic and mitral stenosis, aortic and mitral insufficiency, patent ductus arteriosus, third and fourth sounds, VSD and functional murmur ('innocent' heart murmur). Students are able to formulate any abnormal findings from physical examination.

Student tasks
Preparation
Study the study material. Students are assumed to have the knowledge they gained in the First three years. *The study material also includes the diagnoses in the differential diagnosis.*

Study: www.easyauscultation.com
cardiac examination: heart sounds
Heart sounds tutorial

At the session
Practice

Study material

1) **Student Manual on Consultation (Weeks C1a and C1b): Cardiac examination**
2) **MacLeod's textbook of clinical examination.11th edition ;page 97-106**
3) **Kumar and Clark's clinical medicine. 8th edition. Chapter 14.page 676-679 and 740-50**
4) **Kumar and Clark's clinical medicine. 9th edition. Chapter 23 .page 933-1056**
5) **Heart sounds tracklist**
6) **www.easyauscultation.com especially the heart sounds tutorial.**
7) **Appendix 1 (Explanation of Pathological Heart Sounds) in the Student Manual**

Appendix 1 Explanation of Pathological Heart Sounds

Pressures in the heart
Auscultation sites
Normal heart sounds
Abnormally loud heart sounds
Pathological additional sounds
Murmurs
Relationship between murmurs and sounds
Flow murmur (innocent murmur, physiological murmur)
Broader physical examination in the case of haemodynamically significant valve defects

Pressures in the heart
To understand why heart sounds and murmurs exist you need a knowledge of the physiology of the heart and the pressures there (see the physiology textbook).

Normal auscultation sites

The position of the valve rings in the thorax is shown in Fig. 1.
The regions where valves and any murmurs can best be heard are shown in Fig. 2.

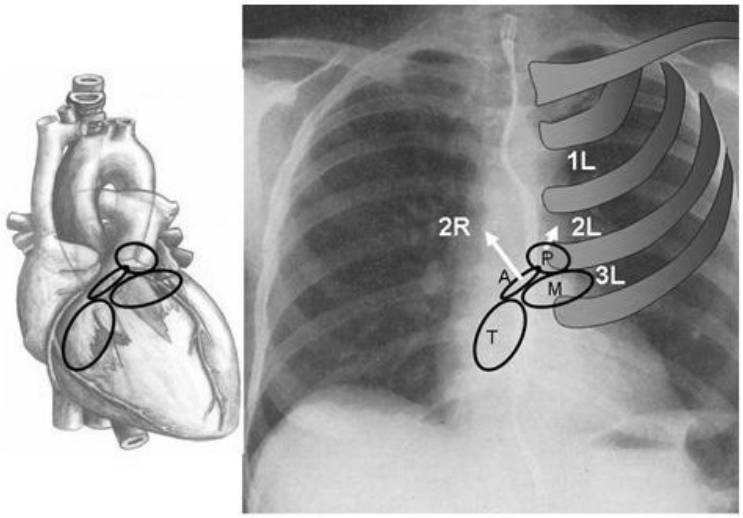

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Fig. 1. The position of the heart valve rings in the thorax
A=aorta, P=pulmonary valve, M=mitral valve, T=tricuspid valve
1L, 2L, 3L=1st, 2nd, 3rd intercostal space z
Left parasternal; 2R=2nd intercostal space
Right parasternal

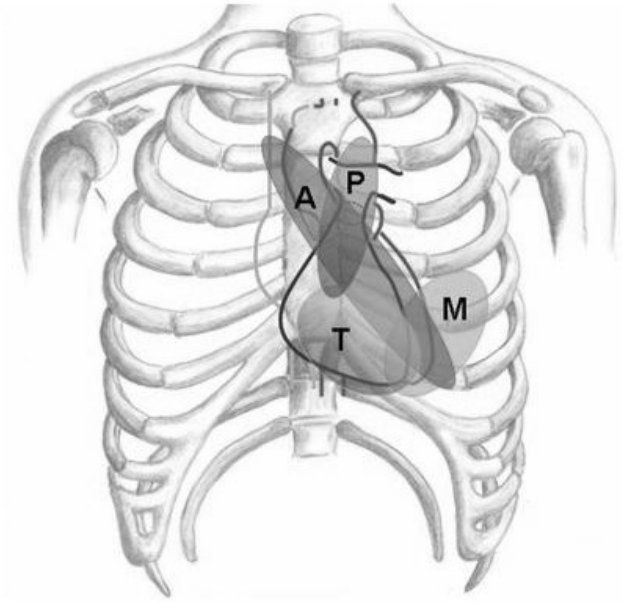

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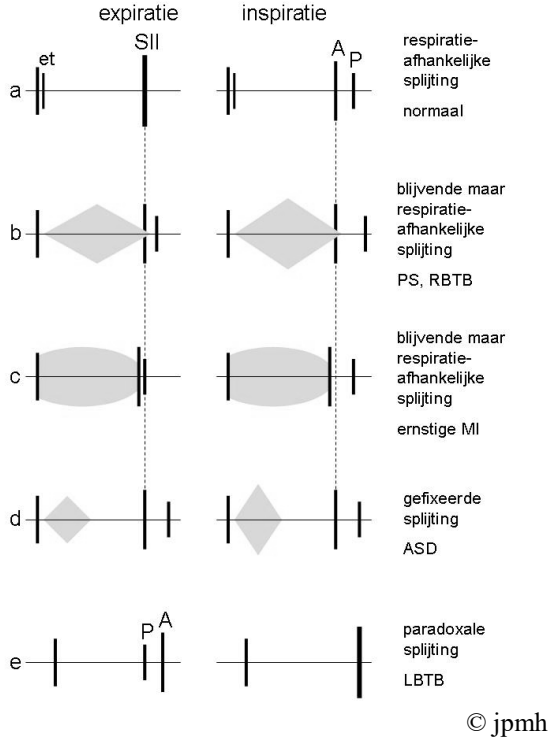
Fig. 2. The regions where valve defects are most audible

Normal heart sounds

For the causes of heart sounds see also the manual PS session Heart and Measuring Blood Pressure. Normal heart sounds consist of valve sounds (valve opening and closing) and a wall sound, a physiological S3. There is also a pathological S3. In healthy children and young adults there can be five heart sounds in each cardiac cycle: S1, 2A, 2P, the aortic ejection sound and S3. They can be auscultated from 3L to the apex. The position of 2P in respect to 2A changes with respiration. During inspiration intrathoracic pressure is reduced, enabling air, blood and lymph to enter the thorax. On *normal* inspiration the returning blood volume can increase by approximately 20%. Thus more blood enters the right atrium and the right ventricle, with the result that RV systole is slightly longer and the pulmonary valve closes later. This is physiological splitting of the second sound. Fig. 3 illustrates this, along with other possible splittings of the second sound. As on inspiration, more blood enters the right ventricle in diastole, which is not the case with the left ventricle, the interventricular septum is displaced to the left. This causes less blood to enter the left ventricle on inspiration, hence less exits as well, therefore blood pressure drops slightly during inspiration (Fig. 4).



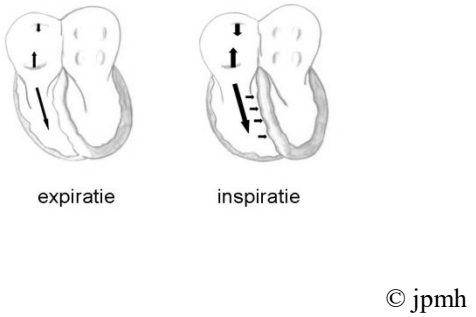


Fig. 3. Possible splittings of the second sound (S2) ES=ejection sound; PS=pulmonary stenosis; MI=mitral insufficiency ASD=atrial septal defect RBTB, LBTB=right/left bundle/fascicular block

Fig. 4. The position of the interventricular septum changes with respiration (for explanation see text).

Abnormally loud heart sounds
The loudness of the mitral valve closure sound depends partly on how open the valve is during LV contraction. With a normal PQ interval the valve returns almost to its rest state (pre-closure state) after atrial systole and only needs to cover a short distance in order to close. With a short PQ interval, the valve is still wide open during the flow from LA to LV, so closure will be louder. S1 that is too soft occurs where the mitral valve is stiff (e.g. MS due to acute rheumatism) or where there is severe heart failure with low pressures. A variably loud first sound occurs e.g. in atrial fibrillation, as the pressure difference across the valve varies with the length of the preceding diastole.

2A that is too soft occurs where the aortic valve is stiff, possibly calcified. This can be accompanied by AS. 2A can be absent if the aortic valve is severely calcified.

2P that is too loud can be consistent with pulmonary hypertension but does not constitute proof. The loudness of 2P should be compared with that of 2A: 2P that is louder than 2A at 4L is regarded as abnormal. 2P that is audible at the apex is also abnormally loud. 2P is not necessarily audible in adults, so 2P heard in a person aged 45, for instance, is abnormal until the contrary has been proven.

An aortic ejection sound that is too loud occurs in the case of a bicuspid aortic valve. This too is not a harmless abnormality, even if there is no clear AS.

Pathological additional sounds
Pathological additional sounds are pericardial knock, tumour plop, opening snap, S4 and pathological S3. All these sounds are most audible at the apex, in left lateral position.

Pericardial knock develops in constrictive pericarditis, resulting in rapid LV filling stopping abruptly owing to the hard pericardium surrounding the heart.

Tumour plop is extremely rare and is caused by a myxoma (in itself a benign tumour) in the LA.

An *opening snap* can occur in MS or TS as a result of the movement of the stenotic valve being abruptly stopped while opening, owing to adhesion of leaves.

S4 is not atrial contraction but the result of atrial contraction. It is a ventricular wall sound. S4 in adults is always pathological and is indicative of elevated end-diastolic pressure in a ventricle accompanied by reduced compliance. S4 has little diagnostic value, however, because of the wide range of abnormalities that cause reduced compliance, and because S4 is not particularly predictive of haemodynamic state.

A *pathological S3* occurs when rapid inflow is stopped abruptly owing to lack of elasticity combined with reduced ventricular compliance. This occurs in heart failure. A normal S3 is indistinguishable from an abnormal S3, pericardial knock or tumour plop. The distinction can usually be made with the aid of the patient's clinical presentation.

What is a gallop?

Some people refer to S1, S2 and a third sound (normal or pathological) as a 'gallop'. Others consider that a gallop is associated with S4 (i.e. it is always abnormal). This is confusing. The term 'gallop' should be reserved for a *pathological* S3 and/or an S4. A physiological S3, then, is not a gallop. A pathological S3 is sometimes referred to as a 'ventricular gallop' or 'protodiastolic gallop'. S4 is also referred to as an 'atrial' or 'presystolic gallop'. In tachycardia diastole is shorter and S3 and S4 can coincide to produce a summation gallop. Gallop is not a clinically useful term, but it remains in use because it sounds so good. It makes more sense to describe what you hear: a pathological S3 and/or an S4. The sound of a galloping horse, incidentally, is most similar to S1, S2 and S3.

Murmurs
Determining the *PMI* of a murmur (the place where it is loudest) makes it much easier to differentiate between causes (Table 1), so it is useful to start with this. The PMI is sometimes difficult to determine, however, and sometimes the PMI of a murmur is not found at the usual place for a particular defect.

PMI	Possible defect	Further differentiation
2R	AS, HOCM	
2L	PS, PDB	PDB: continuous murmur
3L	AS, PS, flow murmur	AS also towards 2R; PS also towards 2L Flow murmur: often stops with patient standing + Valsalva manoeuvre
4L	VSD, TI, pericardial rub	No late systolic silence, except in mini-VSD TI almost always soft and mid-frequency Pericardial rub: in systole and diastole, often louder in incumbent position
Apex	MI, TI	

Table 1. Initial differentiation between systolic murmurs based on the PMI

First assess the *phase*, systole and/or diastole, if necessary by simultaneously palpating the carotid artery pulse. The carotid artery is best suited to this because it is the artery closest to the heart. The time that elapses between LV contraction and the arrival of the pulse wave makes the radial artery pulse less suitable for assessing the phase. In the case of higher heart rates it is easier to look for movement in the suprasternal fossa (which rises in systole) while auscultating. Describe *the place of the murmur in systole or diastole* (e.g. early or late systolic), also the beginning and end of the murmur (contiguous with or separate from heart sounds). The *shape* of a murmur can be crescendo-decrescendo, only decrescendo, band-shaped or spindle-shaped (see Fig. 5). *Loudness dependent on respiration* suggests that the murmur originates in the right side; if the murmur gets louder on inspiration that suggests it is caused by PS or TI. The *frequency* is described as mid, high and/or low. There can be different frequencies at the same time: the common combination of aortic sclerosis and stenosis, for instance, has all the frequencies. Murmurs can also be described as blowing, grating, harsh-sounding or musical. The *loudness* of a murmur is divided into six grades (Table 2). Thrill is not a criterion in this classification by Freeman and Levine (1933), and that is a good thing, as it takes skill and experience to feel a thrill, hence it is fairly often missed. Adding thrill to the criteria would therefore have an adverse effect on grading.

Loudness of murmurs	
Grade I/VI	Soft, only noticeable after a few seconds
Grade II/VI	Soft, but audible immediately
Grade III/VI	Fairly loud
Grade IV/VI	Loud
Grade V/VI	Very loud, still audible with the edge of the stethoscope on the skin
Grade VI/VI	The loudest possible, still audible with the stethoscope just off the chest wall

Table 2. Loudness of murmurs (Freeman and Levine grading, 1933). The original classification does not include the presence or absence of thrill.

Often a Grade VI/VI murmur is also low-frequency, so it can be accompanied by thrill but need not be. The *radiation* of a murmur means the specific direction in which it propagates: an MI murmur, for instance, can radiate to the left axilla, an AS to 2R and a PS to 2L. A very loud murmur that evenly *decreases* in loudness *around the PMI* does not radiate, as there is no main direction of conduction.

Relationship between murmurs and sounds

The most common murmurs with their explanations and relationship to heart sounds are shown in Fig. 5. A systolic leaky valve murmur (MI, TI, VSD) starts with S1 and ends in 2A (=holosystolic=pansystolic). An expulsion murmur starts after S1. In practice, however, the silence between S1 and the start of the murmur is difficult to hear.

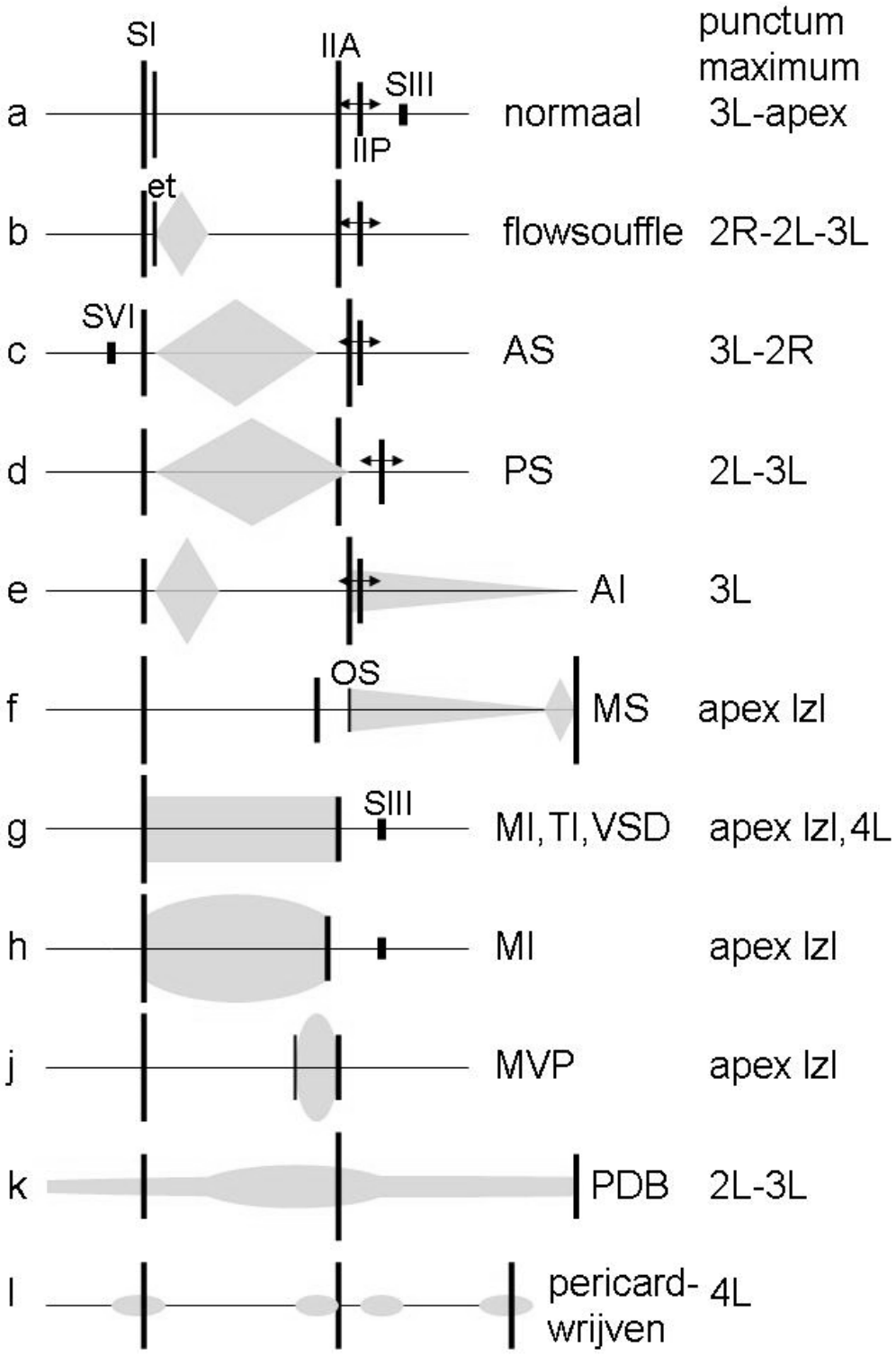


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Fig. 5. Schematic representation of the most common murmurs with their diagnosis and the place(s) where they normally have maximum loudness. The loudness of the sounds is shown by the size of the vertical bars.

a. The five normal heart sounds present in a healthy child. An ejection sound and S3 are not necessarily audible. The position of 2P in respect to 2A changes with respiration (arrow).

b. Flow murmur. This is short-lived.

c. AS with stiff or slightly calcified valve. This causes the ejection sound to be absent and 2A softer than usual. The murmur lasts longer than a flow murmur. This is assessed based on the length of the silence between the end of the murmur and the 2A sound (see also Fig. 7). 2A comes slightly later than usual because of the pressure load on the LV. The position of any S4 is also shown.

d. PS. In this congenital defect the valve is often pliable. It can be accompanied by a pulmonary ejection sound. 2P comes later because of the pressure load on the RV, causing persistent but respiration-dependent splitting of S2.

e. AI. There is usually a prolonged high-frequency decrescendo diastolic murmur, which is usually soft. The systolic murmur is a 'accompanying systole' caused by the volume returning in diastole having to pass through the aortic valve ostium on the next contraction. A PI murmur is the same shape but starts immediately after 2P, is usually shorter, mid to low-frequency, and audible at 2L-3L. In pulmonary hypertension the PI murmur is often high-frequency because of the higher flow rate.

f. MS, audible at the apex, especially in left lateral position. Less blood flows to the LV, with the result that less exits on each beat and systole is therefore shorter. In this example the mitral valve is pliable, so a loud S1 and an opening snap (OS) are audible. The murmur needs to be differentiated from the rarer TS, which is loudest at 4R-4L.

g. MI, audible at the apex, especially in left lateral position. Systole is shorter because the blood readily flows to the LA as well as the aorta, hence the ventricle 'empties' sooner. A murmur of the same shape (but not length!) can be found in TI and VSD.

h. By far the majority of MI murmurs are not band-shaped but spindle-shaped; in some cases (e.g. in chordal rupture) there is even a crescendo-decrescendo shape.

j. Mitral valve prolapse (MVP). As the LV becomes smaller during contraction the mitral valve bulges more, until contact is lost between the leaves and a leak develops. The resulting murmur is often preceded by a click. This shape of murmur is also occasionally found in tricuspid valve prolapse.

k. A combined systolic and diastolic murmur without silence: the continuous murmur consistent with PDB.

l. Pericardial rub. Sounds can occur during major displacements of the heart in relation to the pericardium. The classic triphasic sound occurs during atrial/ventricular systole, relaxation of the ventricle and the rapid ventricular filling phase.

Flow murmur (innocent murmur, physiological murmur)
Every murmur is an audible turbulence in the blood flow. As the ostia of the aortic and pulmonary valves are triangular, not round, turbulence normally always occurs at these valves, often heard as a murmur. A flow murmur is therefore usually loudest at 3L or 2L. The loudness is usually Grade I-III/VI but can be higher. Flow murmur is the most common cardiac murmur. In effect, then, it is part of the normal auscultation pattern. It is fairly easy to distinguish between a flow murmur and minor, moderate and severe AS or PS by means of auscultation. The more severe the stenosis, the longer the murmur. There is an excellent correlation between the length of the murmur and the severity of the stenosis. The length of the murmur is difficult to estimate by auscultation: it is much easier to pay attention to the length of the silence between the end of the murmur and S2. Any doctor can learn to do this with some practice and feedback (Fig. 6). It is important to be able to gauge the severity, as there is often reason to intervene in case of severe AS or PS.

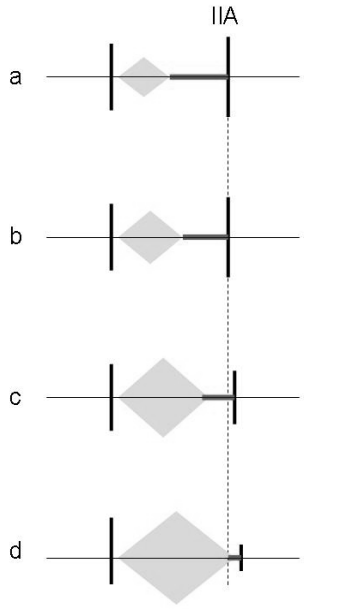


Fig. 6. From flow murmur (a) to increasingly severe aortic stenosis (b-d). The length of the murmur increases with the severity of the aortic stenosis, which can be heard from the length of the silence between the end of the murmur and the aortic closure sound (2A).

A flow murmur can generally be stopped by allowing less blood to flow through the valve ostia. This is done by getting the patient to sit down, but a standing position is much more effective, as less blood then flows back to the heart. If the murmur continues with the patient standing, a Valsalva manoeuvre should be carried out: the patient stops breathing in a calm expiration position and then pushes gently to moderately (the aim is only to push against the RA pressure, which is around 0 mmHg). It is usually enough to 'tighten the abdomen': this delays the incoming blood flow or almost stops it. When starting to push, however, the lungs are also 'squeezed empty', with the result that slightly more blood flows through the aortic valve ostium briefly, so an aortic flow murmur will be louder for a few heartbeats. Sometimes it is necessary to push gently for 15-20 seconds before the murmur stops. If it stops *and the loudness of the heart sounds remains the same* it is a flow murmur. If it does not stop after the Valsalva manoeuvre has been performed correctly there may be a defect, but it could still be an innocent murmur. This requires further investigation (echocardiogram).

Pushing hard on the back of the hand after deep inspiration is an incorrect manoeuvre: the deep inspiration increases the distance between the origin of the murmur and the stethoscope, and pushing hard causes the intercostal muscles to make so much noise that not much can be heard of the heart sounds and murmurs.

A murmur that stops after a Valsalva manoeuvre but is not innocent is caused by a very small muscular VSD: if the LV becomes smaller during the Valsalva manoeuvre the VSD can close, stopping the murmur. This murmur is often loudest at 4L and loud and mid to low-frequency. This VSD is not haemodynamically significant. A murmur that gets louder after a Valsalva manoeuvre is caused by HOCM. In mitral valve prolapse any late systolic murmur may last longer (start sooner) during the Valsalva manoeuvre.

Broader physical examination in the case of haemodynamically significant valve defects
More precise interpretation of a murmur requires more information in addition to case history and auscultation, which can be found from physical examination. Findings from physical examination in the case of haemodynamically significant valve defects can indicate:

Aortic valve stenosis

Always:	- Systolic ejection-type murmur 3L-2R, sometimes also at the apex (along the aorta)
Very often:	- Combined with the murmur, heaving accentuated apex without left-sided failure and not left displaced strongly suggests significant AS.
Often:	- Low pulse pressure, but this does not discriminate between minor and significant AS. Systolic blood pressure is often normal to elevated. - Soft 2A with a stiff and/or calcified valve strongly suggests significant AS, loud 2A and loud ejection sound in the case of congenital AS.
Sometimes:	- Pallor - Left parasternal and/or suprasternal systolic thrill, sometimes at the apex
Rarely:	- Crepitation
Note:	- S4, S3, paradoxical splitting of S2, aortic ejection sound and the loudness of the murmur do not discriminate between minor and significant AS.

Aortic insufficiency

Almost always:	- High-frequency diastolic murmur at 3L with (accompanying systole). There is a fair correlation between the loudness of the AI murmur and the severity of the AI.
Very often:	- Effects of the increased gross stroke volume: pulsus celer, high pulse pressure, 'homo pulsans' (dance of the arteries), positive capillary pulse. Pulse pressure ≥80 mm Hg strongly suggests severe AI. - Apex accentuated and displaced to the lower left.
Often:	- Pallor - Low diastolic blood pressure. Pressure ≤50 mm Hg strongly suggests severe AI.
Sometimes:	- *Systolic thrill* due to the increased gross stroke volume - S1 that is soft or too early - S3 and/or S4 - Low-frequency diastolic murmur at the apex due to the AI flow brushing the mitral valve and causing it to flutter

Pulmonary artery stenosis

N.B. PS is often subvalvular.

Always:	- Systolic expulsion murmur at 2L-3L - Persistent splitting of S2 that varies with respiration
Very often:	- Loud 2P (the valve is often pliable but sometimes stiff or calcified) - Pulmonary ejection sound
Often:	- Thrill at 2L and/or suprasternal - Intensified RV impulse - High A waves in the jugular pulse
Sometimes:	- Elevated CVP in the case of right-sided failure

Pulmonary insufficiency

Almost always: - The presence of a mid or low-frequency diastolic murmur at 3L is diagnostic, but its absence does not rule out PI. The shorter the murmur, the more severe the PI. A murmur can be very loud and mid to low-frequency if there has been valve surgery. Surgery is the most common cause of significant PI.

Often: - RV impulse

Sometimes: - Elevated CVP in the case of right-sided failure

Mitral stenosis

Always: - If the valve is pliable: opening snap (not if the valve is stiff) with diastolic low-frequency soft murmur at the apex in left lateral position; small apex beat ('tap-dance')

- With sinus rhythm also presystolic murmur

Very often: - Completely irregular heart rate due to atrial fibrillation

Often: - Consistent with left-sided failure: crepitation

Sometimes: - Consistent with right-sided failure: high CVP

- 2P sound that is too loud owing to pulmonary hypertension

Mitral insufficiency

Always: - Leaky valve murmur at the apex. Loudness III/VI or more strongly suggests moderate to severe MI.

Often: - Consistent with left-sided failure: crepitation

- Completely irregular heart rate due to atrial fibrillation

- Apex accentuated and displaced to the left.

Sometimes: - Consistent with right-sided failure: high CVP, enlarged liver, oedema

- 2P that is too loud owing to pulmonary hypertension

- Systolic thrill

- S3. The presence or absence of S3 is barely an indication of the severity of the MI.

- Crepitation

Tricuspid insufficiency

Very often: - Leaky valve murmur at 4L-apex. A murmur may be absent even in severe TI, however.

- Positive (systolic) pulse wave of the jugular vein. This strongly suggests severe TI.

Often: - Consistent with right-sided failure: elevated CVP, enlarged liver, oedema, ascites

- Positive hepatic pulse with TI murmur suggests moderate to severe TI. Not finding this does not rule out severe TI.

Pericarditis

Sometimes: - Pericardial rub. This is hardly any indication of the presence or amount of pericardial fluid: about half of patients with tamponade have pericardial rub. The presence or absence of pericardial rub is therefore no indication of pericardial fluid development, increase or decrease.

Abbreviations
S1 = first heart sound
S2 = second heart sound
2A = aortic closure sound
2P = pulmonary closure sound
ES = ejection sound
S3 = third heart sound
S4 = fourth heart sound
OS = opening snap
AS = aortic stenosis
AI = aortic insufficiency
MS = Mitral stenosis
MI = mitral insufficiency
TS = tricuspid stenosis
TI = tricuspid insufficiency
PS = pulmonary stenosis
PI = pulmonary insufficiency
PDB = patent ductus arteriosus (ductus Botalli)
ASD = atrial septal defect
VSD = ventricular septal defect

PS Session Pathological Lung Sounds

Duration
1 hour

Learning outcome
Introduction to the normal and pathological physical diagnostic findings of pulmonary examination

Students are able to carry out a pulmonary examination and recognize pathological lung sounds and differentiate it from normal lung sounds

Student tasks
Preparation
Study the study material. Students are assumed to have the knowledge they gained in the First three years.
Listen to the lung sounds from www.easyauscultation.com
Work up the assignments in Appendix 2.

At the session
Practice with lung sounds, discuss the answers to the assignments in Appendix 2.

Study material

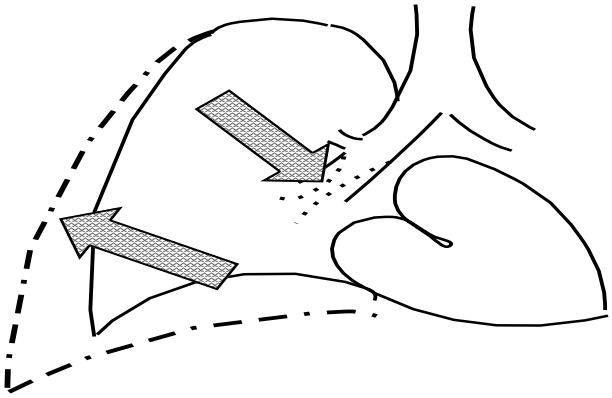
1) **Student Manual on Consultation (weeks C1a and C1b): Pulmonary examination**
2) **MacLeod clinical examination.11th edition.page 139-145**
3) **Kumar and clark;s clinical medicine.8th edition.chapter 15.page 799**
4) **Kumar and Clark's clinical medicine. 9th edition. Chapter 24 .page 1057-1137**

Appendices
Assignments

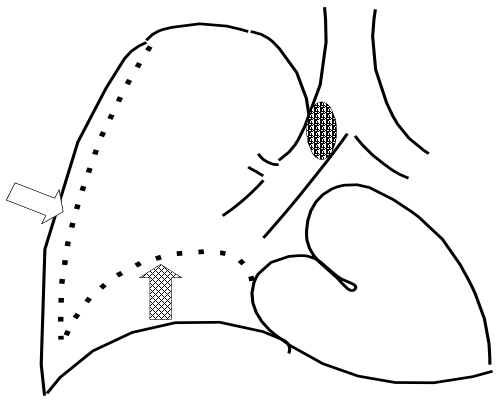
Appendix
Assignment for physical diagnostic findings in respiratory tract disorders

The findings/possible findings from inspection, palpation, percussion and auscultation are set out below for some examples of respiratory tract disorders. Changes in the position of the mediastinum have been omitted for the sake of simplicity.

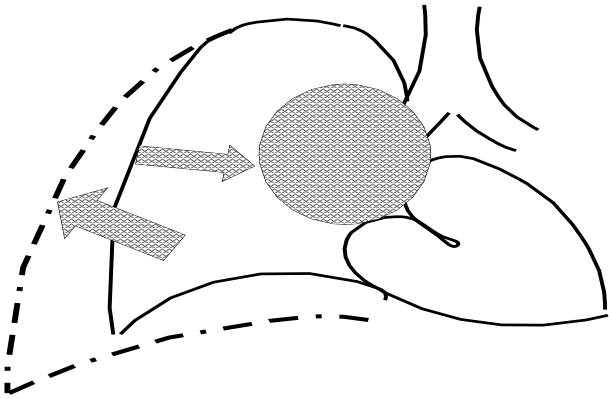
A. Non-localized lower airway obstruction in acute asthma exacerbation
What would you expect to find during a pulmonary investigation, on inspection, palpation, percussion and auscultation?



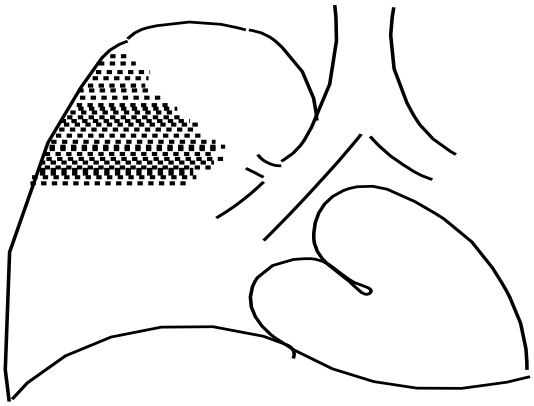
B. Complete obstruction of the right main bronchus (due to tumour, foreign body, mucus plug)
What would you expect to find during a pulmonary investigation, on inspection, palpation, percussion and auscultation?



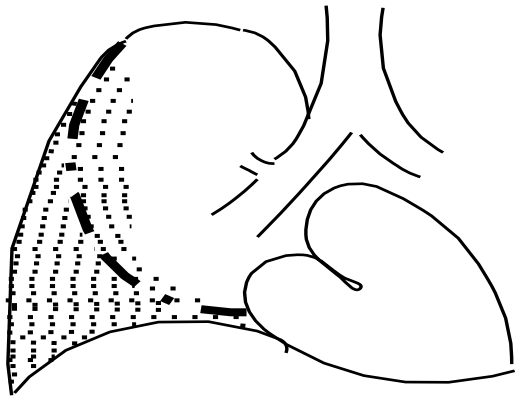
C. Complete right-sided pneumothorax
What would you expect to find during a pulmonary investigation, on inspection, palpation, percussion and auscultation?



D. Infiltrate/acute right-sided pneumonia
What would you expect to find during a pulmonary investigation, on inspection, palpation, percussion and auscultation?



E. Large quantity of pleural fluid in right lung
What would you expect to find during a pulmonary investigation, on inspection, palpation, percussion and auscultation?



CiA Session Respiratory and Circulatory Systems

Duration
2 hours

Structure
20 min. for Socratic questioning
15 min. for Case 1
10 min. for postmortem discussion
15 min. for Case 2
10 min. for postmortem discussion
15 min. for Case 3
10 min. for postmortem discussion
15 min. for Case 4
10 min. for postmortem discussion

Learning outcome
Students are able to take a history, pose questions to test their hypotheses and draw up a differential diagnosis.
Students are able to formulate any abnormal findings from physical examination.

Student tasks
Preparation
Work up the doctor's role for Cases 1-4. Study the study material. Students are assumed to have the knowledge they gained in the First three years. *The study material also includes the diagnoses in the differential diagnosis*. The students who have been assigned the patient role prepare for this.

At the session
Participating in role-play and reflecting and receiving feedback on this

Study material

1) **Medical Consultation: general principles and background**
2) **Student Manual on Consultation (C1a and C1b): cardiac examination, pulmonary examination, measuring blood pressure, examining for oedema and measuring CVP, examining the peripheral vessels**
3) **MacLeod Clinical examination.11 th edition page 81-152**
4) **Kumar and clark;s clinical medicine 8th edition.chapter 14, page 723-751 and chapter 15, page 833-839 and 864-865**
5) **Kumar and Clark's clinical medicine. 9th edition. Chapter 23 .page 933-1056**

Appendix 1

Assignment

Work up the doctor's role for Cases 1-4. Prepare the questions you intend to ask to identify the main health issue and for the specific history. What questions do you intend to ask to test your hypothesis? Draw up a DD and list possible abnormalities that you would expect to find in the physical examination.

Case 1

Setting:	You are in the emergency room.
Patient data:	Ahmed Mohamed, Al Hasa, Age 55, married with three sons.
Main health issue:	severe chest pain for the past hour
Care request:	The patient is scared of having a heart attack.
History:	long standing hypertension.
Case history:	He was feeling well this morning but developed sudden, tearing chest discomfort while lifting weights with a friend. He describes the pain as severe and reports discomfort in his back as well.
Context factors:	he appears uncomfortable while lying on the exam table and is clutching the centre of his chest.

Case 2

Setting:	In consulting room
Patient data:	Hussein Mohamed, aged 25, single
Main health issue:	routine medical examination.
Care request:	the patient wants to know if he is fit or whether there could be something wrong.
History:	Clean, never been under a specialist, never been admitted to hospital.
Case history:	nine months ago, he experienced an episode of syncope while playing volleyball
Context factors:	His father died at age of 40 years for unclear reasons.

Case 3

Setting:	GP's consulting room
Patient data	Ahmed, student, aged 21
Main health issue:	Suddenly developed pain in the left chest while playing football and felt chest tightness.
Care request:	Is scared that there is something seriously wrong.
History:	Some asthma as a child, otherwise always in good health.
Case history:	The football match had only just started and you hadn't even touched the ball. You suddenly felt a pain in the left of your chest and tightness. Immediately afterwards you felt dizzy and had to lie down. The referee stopped the game and a doctor was called.
Context factors:	The family came to live in Al Hassa from an African country where your father worked as a diplomat two years ago.

Case 4

Setting:	You are making a house call to a patient in an old people's home.
Patient data	Mrs Huda, aged 81
Main health issue:	Cough and fever
Care request:	None: the patient sees no need to call the doctor but the nurse is very keen.
History:	Age 76: episodes of atrial fibrillation Age 79: congestive heart failure
Medication:	Acetylsalicylic acid 1 mg 80 x day Furosemide 1 mg 40x day
Case history:	Heteroanamnesis from the nurse, as the patient is drowsy and unwell. It seems that she has had a substantially raised temperature for two days now. She is coughing a lot and cannot really lie down flat in bed. She is short of breath and keeps coughing. She is worn out. The nurse thinks it is necessary to call the doctor, but the patient sees no need. She had a heavy cold two weeks ago, with a sore throat and cough. The patient talks intermittently.
Context factors:	The husband has died. The patient has been living in an old people's home for some considerable time now. A lot of the residents were ill two weeks ago..

PS Session: Pathology in Cardiac/Pulmonary Examination

Duration
2 hours

Structure
20 min. for Socratic questioning
20 min. for Case A
20 min. for Case B
60 min. for practising cardiac examination, pulmonary examination, measuring blood pressure, examining for oedema and measuring CVP, examining the peripheral vessels

Learning outcome
Students are able to

- carry out pulmonary examination and diagnose the pathologies as listed in the learning outcome for the PS Session Pulmonary Examination (Consultation).
- carry out cardiac examination and make a clinical diagnosis of the pathologies, as listed in the PS Session Cardiac Examination (Consultation).
- name the pathological findings from examination of the heart, lungs, peripheral vessels, oedema and from measuring blood pressure and CVP.

Student tasks
Preparation
Study the study material.
Work up the assignment.
At the session
Participating in the Socratic questioning, discussing the case and practising physical examination

Study material

1) **Student Manual on Consultation (C1a and C1b): cardiac examination, pulmonary examination, measuring blood pressure, examining for oedema and measuring CVP, examining the peripheral vessels**
2) **Macleod,'s clinical examination 11th edition.page 79-152**
3) **Macleods examination of the respiratory system/cardiovascular system/measurement of blood pressure.13th edition.www.youtube.com**
4) **Kumar and clarks clinical medicine.8th edition.chapter 14 page 675-79 and chapter 15. page 798-800.**
5) **Kumar and Clark's clinical medicine. 9th edition. Chapter 24 .page 1057-1137**

Appendices
1. Assignment for Cases 1 and 2
2. Valsalva manoeuvre
3. Checklists

Appendix 1

Assignment
Physical examination on a patient is generally carried out based on a particular expectation. You may also expect to find nothing – i.e. no abnormalities – in a patient.
Prepare Cases 1 and 2 for this session.

Case 1

Setting: GP practice

Mr Abdullah, aged 68, has come in for his twice-yearly blood pressure check-up, but he has brought the date forward. He used to be a farmer. History clean, apart from three years of hypertension for which he was prescribed atenolol 50 mg 1x day. He smokes ten cigarettes a day. He is not overweight.

Medication: blue and brown inhalers for many years now.

Reason for coming: blood pressure check-up. Few symptoms. When asked the patient indicates more shortness of breath with a tight sensation. No pain problems, particularly not on exertion. The patient has had more fatigue for some time now. There is more frequent urination, especially at night, and the feet swell up as the day goes by. Targeted questioning reveals orthopnoea. The lungs are working well but he coughs more.

Family history: brother had myocardial infarction at the age of 62, mother had diabetes.

What is the problem? What is your DD/provisional diagnosis?
What do you expect to find on physical examination to confirm your diagnosis?

Case 2

Setting: A&E

Mrs Khadeeja aged 56, history of COPD. Usually has her check-up from the Professor himself and has come in because she was told that was OK if she can't cope. Unfortunately the Professor is at a conference, so the secretary has referred her to A&E.

Other data: uses three kinds of inhalers; smokes; works as an executive secretary at a government building.

History: various admissions for COPD exacerbations; also gall bladder removal

Symptoms gradually progressive, chest tightness after a stressful period; dissatisfied with the state of affairs; talks intermittently and sneezes a lot. Feels shivery. Coughs more than usually and longer, mucus looks even more unpleasant than usual, green-grey, no haemoptysis. A month ago she was in Tanzania, where her son works at the embassy.

Medication: Symbicort (Turbohaler), Ventolin (metered-dose aerosol), Atrovent, and uses her husband's Bricanyl. She does not want to use a spacer.

What is the problem? What is your DD/provisional diagnosis?
What do you expect to find on physical examination to confirm your diagnosis?

Appendix

Valsalva manoeuvre

Innocent or pathological heart murmur?

A murmur is an audible turbulence in the blood flow. Diastolic murmurs are always pathological. Systolic murmurs can occur with normal valves (flow murmur = physiological murmur = innocent murmur) or be due to a valve defect or shunt (pathological murmur).

How can you differentiate between these murmurs clinically?

An innocent murmur may stop when the blood flow through the respective valve ostium slows down. This can be achieved by getting the patient to stand up, as less blood then flows back to the heart under the influence of gravity.

Find the PMI of the murmur in the standing patient again, as the heart rate drops down when the patient stands. If the murmur stops in a standing position (getting softer is not enough!) AND THE LOUDNESS OF THE SOUNDS REMAINS THE SAME it is an innocent murmur (the only exception is a small VSD murmur).

If the murmur remains audible in a standing position a Valsalva manoeuvre can be carried out. This reduces the blood supply to the heart (via the venae cavae) even more than just standing. In a Valsalva manoeuvre the patient stops breathing in a calm expiration position and then pushes gently to moderately (the abdominal muscles must be tensed). It is not good to take a deep breath first and then push, as that increases (a) the thoracic volume and (b) the distance between the auscultation site/chest and the valves, making the sound softer. This also applies to breathing in and blowing on the hand, as when pushing to check for inguinal hernia.

Auscultate for 15-20 seconds. If the murmur stops now, it was innocent. If the Valsalva manoeuvre does not stop the murmur it is probably pathological (although it could be an innocent murmur if there is rapid blood flow through normal valves). The latter needs to be assessed by a specialist; a murmur that does not stop as a result of a Valsalva manoeuvre must be analysed, irrespective of the symptoms.

Appendix
Cardiac Examination Checklist

Prior to the examination
Greet the patient.
Explain the examination and the reason for it.
Give undressing instructions (remove brassiere).
Remove jewellery, wash hands.
Make sure your hands and the stethoscope are warm.

Inspection
Dyspnoea (at rest, when undressing and dressing), cyanosis, pallor
Fingertips/nails
Lips/tongue
Apex beat (supine position)

Palpation
Apex beat
(first with the flat of the hand to gain an indication,
then locate and assess with the fingertips)
in supine position to determine the site
in left lateral position to assess quality

Carotid artery (to check whether the apex beat is positive or negative)

Auscultation
Frequency and rhythm
First and second sound, splitting of second sound, additional sounds, murmurs (to determine systole palpate carotid artery)
Listen with membrane
Listen with bell
- Apex: supine and in left lateral position
- Third and fourth left ICS
- Second right ICS
- Second left ICS

During the examination
Explanation during the examination
Instructions on posture and breathing
Close observation
Eye etc. contact with the patient
Communicate well and use the correct techniques'.

After the examination
Announce that the examination is over.
Give dressing instructions.
Conclude the examination and present the findings.
Wash hands.

General
Displays knowledge of the skill.

Pulmonary Examination Checklist

Prior to the examination
Greet the patient.
Explain the examination and the reason for it.
Give undressing instructions.
Remove jewellery, wash hands.

Inspection
General
Signs of shortness of breath, skin colour
Shape of the thorax at rest
Thoracic respiratory movements, muscle tone
Count respiratory rate (for 30 seconds).
Draw patient's attention away from breathing.

Palpation
Palpate respiratory excursions
with the flat of the hands over the diaphragm

Percussion
Technique
Correct percussion sites
Dorsal lung borders (delineate on skin!)

Auscultation
Use of the stethoscope
Auscultation sites

During the examination
Explanation during the examination
Instructions on posture and breathing
Close observation
Eye etc. contact with the patient
Communicate well and use the correct techniques'.

After the examination
Announce that the examination is over.
Give dressing instructions.
Conclude the examination and present the findings.
Wash hands.

General
Displays knowledge of the skill.

Blood Pressure Checklist

Prior to the examination
Greet the patient.
Explain the examination and the reason for it.
Give undressing instructions.
Remove jewellery, wash hands.

Applying the cuff correctly
Locate the brachial artery by means of palpation.
Approx. 3 cm above cubital fold etc.

Measuring BP correctly
Inflate cuff rapidly while palpating.
Brachial artery (or radial artery)
Place stethoscope membrane on brachial artery.
Allow the mercury column to drop 2-3 mm per second.
Read off systolic pressure.
Read off diastolic pressure.
Take BP on both arms.

During the examination
Explanation during the examination
Give instructions on position.
Eye etc. contact with the patient
Communicate well and use the correct techniques'.

After the examination
Announce that the examination is over.
Give dressing instructions.
Conclude the examination and present the findings.
Wash hands.

General
Displays knowledge of the skill.

Oedema and Central Venous Pressure Checklist

Prior to the examination
Greet the patient.
Explain the examination and the reason for it.
Give undressing instructions.
Remove jewellery, wash hands.

Palpating for oedema
Dorsal surface of the foot
Inner ankle
Tibia

CVD
Locate external jugular vein
Close external jugular vein
Adjust angle of head of examination table
Read off CVD

During the examination
Explanation during the examination
Give instructions on position.
Close observation
Eye etc. contact with the patient
Communicate well and use the correct techniques'.

After the examination
Announce that the examination is over.
Give dressing instructions.
Conclude the examination and present the findings.
Wash hands.

General
Displays knowledge of the skill.

Peripheral Arteries Examination Checklist

Prior to the examination
Greet the patient.
Explain the examination and the reason for it.
Give undressing instructions.
Remove jewellery, wash hands.

Inspecting the skin of the parts of the body concerned, especially extremities
Colour
Skin defects
Hair growth
Nails
Shape of feet
Oedema

Auscultation
Listen over:
Carotid arteries (high)
Carotid arteries (low)
Abdominal aorta
Renal arteries
Common iliac arteries
Femoral arteries

Palpation
Carotid artery
Brachial artery
Radial artery
Abdominal aorta
Femoral artery
Popliteal artery
Posterior tibial artery
Dorsalis pedis artery

During the examination
Explanation during the examination
Give instructions on position.
Close observation
Eye etc. contact with the patient
Communicate well and use the correct techniques'.

After the examination
Announce that the examination is over.
Give dressing instructions.
Conclude the examination and present the findings.
Wash hands.

General
Displays knowledge of the skill.

CC Session Chest Tightness

Type
Complete consultation session with simulation patients

Duration
Session: 3 hours

Learning outcome
Students are able to conduct a complete consultation with a simulation patient. All the phases of the consultation should be dealt with.

Student tasks
Preparation
Study the study material. Students are assumed to have the knowledge they gained in the First three years. Study the checklists so far.

Three students conduct a consultation with a simulation patient. Prepare for this. Take all the equipment you need with you, e.g. a stethoscope. Dress appropriately. Introduce yourself to the simulation patient.

As regards subject matter, you are expected to have prepared by knowing the required skills such as history-taking and physical examination. You should also be able to put forward a proposal on treatment strategy in the context of the week's theme.

At the session
Active participation in the CC session: in the role of intern conducting the consultation, and as a listener giving feedback.

Study material
Study the material from previous Ci and PS sessions.

Equipment to be taken along by students
Reflex hammer
Stethoscope
Penlight

Appendices
1. Feedback list for the CC session

King Faisal University

Medicine Student Manual

Academic year 2017-2018

Week -GIT and general internal problems

CiA Session Digestive Tract

Duration
2 hours

Structure
15 min. for Socratic questioning
15 min. for Case 1
20 min. for postmortem discussion
15 min. for Case 2
20 min. for postmortem discussion
15 min. for Case 3
20 min. for postmortem discussion

Learning outcome
Students are able to take a history, pose questions to test their hypotheses and draw up a differential diagnosis.

Students are able to formulate any abnormal findings from physical examination.

Student tasks
Preparation
Work up the doctor's role for Cases 1-3.

Study the study material.

Students are assumed to have the knowledge they gained in the first three years. *The study material also includes the diagnoses in the differential diagnosis.*

The students who have been assigned the patient role prepare for this.

At the session
Participating in role-play and reflecting and receiving feedback on this

Study material

1) **Medical Consultation: general principles and background**
2) **MacLeod's textbook of clinical examination.13th edition; chaper 8; page 165-194**
3) **Kumar and Clark's clinical medicine. 9th edition; chapter 13; page 357-436: chapter 14;page 437-488: chapter 15;page 489-513**

Appendices
1. Cases 1-3

Appendix 1

Assignment

Work up the doctor's role for Cases 1-3. Prepare the questions you intend to ask to identify the main health issue and for the specific history. What questions do you intend to ask to test your hypothesis? Draw up a DD and list possible abnormalities that you would expect to find in the physical examination.

Case 1

Setting:	GP's consulting room
Patient data:	Mr Sheikh, aged 54
Main health issue:	Increase in abdominal girth
Care request:	Is scared that there is something seriously wrong.
Case history:	The abdomen has become much larger in the past ten days.

Case 2

Setting:	You are making a house call to a patient at home.
Patient data:	Abdul Latif, aged 73
Main health issue:	Sudden pain in the left abdomen
Care request:	Help me get rid of the pain
Past History:	Appendectomy at the age of 28
	Age 58: COPD
	Age 58: hypertension
	Age 63: myocardial infarction
	Intermittent claudication since the age of 70
	Constipation for many years, sometimes with bleeding haemorrhoids
Case history:	Pain in the left abdomen that started a few hours ago
Context factors:	Widower, wife died two years ago
Medication:	Seretide 1 puff 2 x day
	Carbasalate calcium 80 mg 1 x day
	Metoprolol 50 mg 1 x day
	Simvastatin 40 mg 1 x day

Case 3

Setting:	GP's consulting room
Patient data:	Abdul Majeed aged 56
Main health issue:	Diarrhoea
History:	DM for one year
Medication:	Metformin 850 mg 3 x day
Context:	Works as a publisher, married with two sons

PS Session Abdominal Examination as Indicated

Duration
2 hours

Learning outcome
Knowing the indications for targeted abdominal examination and being able to carry it out and interpret it

Structure
20 min. for Socratic questioning by discussing the assignments
10 min. for demonstration of Standard Abdominal Examination by students assigned role A
10 min. for demonstration of Standard Abdominal Examination by students assigned role B
10 min. for demonstration of Standard Abdominal Examination by students assigned role C
70 min. for practising the above abdominal examinations

Student tasks
Preparation
Study the study material. Students are assumed to have the knowledge they gained in the First three years.
Answer the questions in Appendix 1. Prepare for demonstration of abdominal examination

At the session
Participating in the Socratic questioning, demonstrating and practising abdominal examination.

Study material
Study the Student Manual on Consultation (Weeks C1a and C1b): Abdominal Examination.
MacLeod clinical examination

Appendices
1. Questions
2. Standard Abdominal Examination Checklist

Appendix 1

Questions

Liver & Bile Ducts

1. What can cause ascites?
2. How to differentiate in physical examination?
3. What are the reference values for the liver span?
4. Why does the lower border of the liver also need to be percussed in the midline?
5. What can cause an enlarged left lobe?
6. What are signs of cholestasis?
7. What are signs of portal hypertension?
8. What are liver stigmata and what are they indicative of?
9. What else should you watch out for when inspecting and why?

Kidneys & Urinary Tract

1. What conditions cause kidney enlargement?
2. What conditions cause costovertebral angle tenderness?

Appendix 2

Standard Abdominal Examination Checklist

Prior to the examination
Greet the patient.
Explain the examination and the reason for it.
Undressing instructions /patient's posture/privacy
Remove jewellery, wash hands.

Inspection
General :
Jaundice (eyes, skin),pallor, effects of scratching, haematomas, scars from any operations, intravenous drug use
Cachexia, caput medusae, ankle oedema
Gynaecomastia, spider naevi, palmar erythema
shape: distended, sunken
Local shape of umbilicus: inverted or protruding.
Swellings
Groin area: swellings, skin abnormalities
Skin: scars, striae, effects of scratching, colour

Abdominal movements
- Abdomen moving in sync with breathing? Visible peristalsis?
- Pulsation: abdominal aorta, pulsating swelling?

Palpation
Ask if there pain before palpation
Superficial : palpate the nine quadrant (tenderness, guarding, rigidity, superficial masses)
Deep: systematic, tender area(s)
- Liver: midclavicular line and midline, breathing instructions
- Spleen: from right iliac fossa toward left hypochondrium.
  If not palpable : patient on the right lateral position (two hands).

Kidney: Bimanual
Groin area: swellings
Digital rectal examination
Examination of the back (sacral edema, deformity, renal angel tenderness)

Percussion:

- Liver: measure the liver span
- Spleen: size (determined from right lower abdomen)
-Ascites : shifting dullness-Fluid thrill.

Auscultation:
Bowel sound
- Quantity: absent, slight, vigorous.

Renal artery: bruit.

During the examination
Explanation during the examination
Instructions on posture and breathing
Close observation
Eye etc. contact with the patient
Communicate well and use the correct techniques.

After the examination
Announce that the examination is over.
Give dressing instructions.
Conclude the examination and present the findings.
Wash hands.

General Displays knowledge of the skill.

Ci-B Session Treating Gastrointestinal Problems

Group size
9-10 students

Duration
2 hours

Structure
5 min. for introduction
35 min. for Case 1
35 min. for Case 2
35 min. for Case 3
10 min. for postmortem discussion

Learning outcome
Students are able to conduct a treatment/strategy discussion based on a diagnosis.

Student tasks
Preparation
Work up the doctor's role for Cases 1-3 using the 6-Step method.
Study the drug groups suitable for the indication (Step 3), without taking the patient-specific data into account (that is Step 4).
Study the study material.

At the session
Participating in role-play and reflecting and receiving feedback on this

Study material
Medical Consultation: general principles and background
Rang and Dale pharmacology
BNF
Appendices
1. Cases 1-3

Appendix 1

Assignment

Work up the doctor's role for Cases 1-3. Each student will take each of the three roles, doctor, patient and observer. Think about communicating clearly when conducting the discussion. Remember as a doctor that this is the last phase of the consultation: detailed history-taking has already been done by this stage. Begin with a summary of the case history (see Case) and base it on the diagnosis reached. Follow the 6-Step model in your treatment consultation.

Prepare your treatment recommendation using the information you now have at your disposal. Write a prescription if appropriate.

Work up the case on the 6-Step form and take it to the session.

Case 1

Setting: GP's consulting room You don't know the patient, who is staying for a few weeks with his daughter, who is registered with you.

Patient data: Dawood, aged 80, living in Hofuf

History: Chest pain

Medication: Occasionally bought Dulcolax, which thins stools but makes the stomach cramps worse.
The boxes from the pharmacy state:
isosorbide mononitrate 60 mg 1 tab 1 x day
Aluminium hydroxide antacid 500 mg/5ml oral suspension 4-6 times/day.

Main health issue: Constipation

Care request: The patient would like medication to relieve the constipation. The symptoms have got worse in the past few months. His daughter sent him.

Case history: Bowel movements have always been sluggish but have got worse in the past few months. Hard pellet-like stools only twice a week now. Lots of abdominal cramps and wind. No blood or mucus in stools.
When asked the patient says that the symptoms have got worse since he started taking antacids six times a day, which have been added to his treatment for heartburn.

Physical examination and additional lab tests:
BP 135/80 mmHg; heart rate 80 bpm
A resistance is felt in the left lower abdomen, presumably an intestinal flexure containing hard faeces.

Diagnosis: Habitual constipation aggravated by aluminium hydroxide antacid

Case 2

Setting: House call in general practice
The patient moved to an old people's home only recently. You do not know her and have not yet received her medical record from her previous GP.
Patient data: Ms Amina, aged 55, living in Hofuf
History: High blood pressure
Medication: The boxes from the pharmacy state:
hydrochlorothiazide 25 mg 1 x day

Main health issue: Pain in upper abdomen
Reason for making appointment:
The symptoms have lasted for a few weeks.
Care request: Wants to know what the problem is and would like medicine for the stomach pain.
Case history: Pain in the upper abdomen after meals for the past few weeks, with varying degrees of nausea and sporadic heartburn. When asked: good appetite, no weight loss, no difficulty swallowing, no belching. Stools normal. Case history otherwise normal.
Physical examination and additional lab tests:
Some epigastric tenderness, otherwise nothing unusual
H.pylori stool antigen: positive

Diagnosis: Gastric ulcer most probably due to *H.pylori* infection.

Case 3

Setting:	House call to an old people's home
Patient data:	Mrs Huda, aged 84
History:	Three years ago: CVA Eight years ago: diverticulitis Twelve years ago: hypertension Fifteen years ago: diverticulosis
Medication:	Movicolon as required 1-2 sachets Acetylsalicylic acid 30 mg 1 x day Enalapril/hydrochlorothiazed 20/12.5 mg
Main health issue:	Diarrhoea
Care request:	Feels unwell, would like to get better.
Case history:	Abdominal cramps since 8 a.m. yesterday, nausea, vomiting and diarrhoea. This is currently going the rounds in the old people's home where the patient lives, probably an outbreak of norovirus. Diarrhoea is loose and thin, no blood or mucus, every four hours.. Micturition: small amount every four hours, cannot see colour. Vomited food at first, now only bile, every few hours. Sometimes manages to keep down a few sips of tea.
Physical examination:	Drowsy, turgor pressure moderate, temperature 38.7ºC BP 120/60 mmHg, heart rate 82 bpm Abdomen: vigorous, non-resonant peristalsis, supple, some non-localized tenderness
Diagnosis	Acute diarrhoea and vomiting; danger of dehydration

PS Session 1. Palpating a Swelling
2. Head and neck examination

Duration
2 hours

Learning outcome
Students are able to:
- Inspect and palpate a swelling and report on this.
- Differentiate between the aspects of a swelling that must be examined and additional aspects that may also be examined.
- Carry out head and neck examination satisfactorily and systematically.

Student tasks
Preparation
Study the study material. Students are assumed to have the knowledge they gained in the First three years.

At the session
Participating in the Socratic questioning, practising and taking part in the examination.

Study material
Anatomy of the head and neck
Study the Student Manual
MacLeod clinical examination

Appendices
1. Theory of Palpating a Swelling
2. Theory of Head and Neck Examination
3. Head and Neck Palpation Checklist
4. Palpating a Swelling Checklist

Appendix 1
Theory of Palpating a Swelling

Palpation
When palpating a swelling, or an organ where there is a swelling, various characteristics of the swelling can be determined. The aspects of a swelling that should be examined as standard practice are as follows:

- Site (can usually be determined by inspection, but sometimes only by palpation)
- Pain/tenderness
- Size
- Shape
- Surface
- Consistency (the compressibility of the swelling)
- Relationship to the surrounding area
- Circumscription

These are aspects that are always included in your notes on the examination. You need to record your findings on these points to make it clear to another doctor what kind of swelling it is and to enable its progression to be monitored.
Some other aspects of a swelling that can also be examined are:

- Temperature
- Fluctuation (displacement of fluid in an enclosed space: fluctuation can only be induced if the wall of the space is elastic.)
- Pulsation
- Is there a hernial canal? (an opening in a structure, usually at the site of a pre-existing weakness, through which tissue from underlying structures can protrude)
- Crepitus (this is palpable when air or gas is trapped in tissues beneath the skin.)

There are also two other non-palpatory aspects:

- Auscultation in case of thyroid enlargement.
- Transillumination (transmission of light through a swelling when illuminated by a light source, which shows that the swelling contains clear serous fluid)

These are aspects that should only be examined when indicated, usually when they can help you to narrow down your DD.

Description of the skills
There are certain requirements before you start your examination, of course. Your hands must be clean (remove jewellery, wash your hands) and warm. You must also give the patient the correct explanation and instructions: an explanation of what you are going to do, and instructions to the patient on such things as what clothing to remove and what position to adopt.

Palpation in general
Palpation must be carried out with the volar side of the fingers. You should palpate with one or more fingers, depending on the size of the swelling.
Keep your hand and fingers flat and start parallel to the skin. Keep your fingers extended and make a sliding or gently rotating movement.
Palpate superficially first, then deeply. Superficial palpation is in effect done entirely in the plane of the skin. When palpating deeply you apply more pressure so that your fingers go in a bit deeper, and you can bend them slightly. But be careful not to prod (feel with your fingertips), as that is unpleasant for the patient.
Realize that palpation can be painful, so observe the patient's reactions closely.
Palpate carefully and warn the patient if you cannot avoid causing pain.
Below are examples of the various aspects, with details of how to examine or take notes where appropriate.

Aspects that should always be examined (mandatory aspects)

Site
If the swelling is visible you determine the site by inspection. If the swelling is not visible you are dependent on palpation to locate it. State clearly in your notes where the swelling is, including whether it is medial or lateral, ventral or dorsal (hand: volar or dorsal; foot: plantar or dorsal), cranial or caudal, distal or proximal. You can also describe the site in relation to another structure, for example 5 cm caudal to the navel, in the midline. You can always make a drawing to clarify what you mean: this is often more precise and easier than describing the site. To indicate the site of the swelling you can also use the subdivision of the body into regions, which you can find e.g. in an anatomy textbook.

Pain/tenderness
A swelling may be painful for the patient without being touched. 'Tenderness' refers to pain or additional pain caused by touching the swelling and exerting pressure on it. To assess this you should not only ask the patient whether touching it is painful but also observe his reaction and facial expression. Always be careful to press gently first and only increase the pressure somewhat more if that is not painful. You should always record both the presence and degree of tenderness in your notes.

Size
This can either be measured or estimated. When taking notes always state whether the size has been estimated or measured. State the size in centimetres in two or three dimensions (length, width, and thickness if this can be determined). Estimating size can be very difficult, it is really something that needs to be learnt. Comparing the size of the swelling to that of a familiar object (e.g. a particular coin, an orange) is unreliable, so this should preferably be avoided.

Shape
A swelling could for instance be round or globular, oval, elongated, bean-shaped, or oval with offshoots. Some swellings are decidedly irregular in shape.

Surface
Smooth, irregular, lobed, etc.

Consistency
The consistency may be hard (non-compressible, e.g. bone), firm (compressible but with marked resistance, e.g. a tensed muscle) or soft (compressible without much resistance, e.g. a relaxed muscle).

Relationship to the surrounding area
Determining the relationship of the swelling to the surrounding area means establishing whether it originates in a particular tissue layer or structure or grows into another layer or structure. This involves finding out whether the swelling is mobile in relation to surrounding structures.

To determine whether the swelling is mobile in relation to the skin (this should be done in the case of superficial swellings), try to lift up a skin fold with your thumb and index finger at various points over the swelling. If the swelling is attached to the skin, the skin cannot be moved separately from the swelling and you will not be able to pick up a skin fold.

To determine the relationship between the swelling and surrounding structures, try to move the swelling in its entirety in relation to those structures. If you can do this, the swelling is referred to as mobile in relation to the surrounding structures. This mobility is often in relation to the underlying or overlying layer (e.g. the skin). If one of the surrounding structures is a muscle it may be easier to get the patient to tense that muscle.

Circumscription
Determining the circumscription of a swelling means assessing whether it is circumscribed or uncircumscribed in relation to the surrounding tissue. A circumscribed swelling is clearly delineated from the surrounding area, whereas an uncircumscribed swelling appears rather to merge with the surrounding tissue.

Aspects that should only be examined when indicated (optional aspects)

Temperature compared with the surrounding area
The best way of determining the temperature of the swelling (or the skin over it) is with the dorsal side of your hand and/or fingers. Compare the temperature of the swelling with that of the surrounding area. You should also compare the temperature with the contralateral side (e.g. in the case of a swelling on the left knee also palpate the right knee). Palpate both sides with the same hand.

Fluctuation
Checking a swelling for fluctuation involves displacing fluid in a enclosed space. If there is no fluid in the swelling it will not fluctuate. Place a finger or hand on either side of the swelling and press one side of the swelling with that hand or finger. If there is fluctuation the other hand or finger will feel the swelling expanding.

Pulsation
Palpate the swelling and check whether you can feel the patient's heartbeat in it. Remember that there can also be pulsation beneath the swelling. Try to differentiate between the two (a swelling that originates in an artery will pulsate expansively, whereas a swelling up against an artery will not pulsate expansively).

Reducible
Exert pressure on the swelling with the flat of your fingers or hand and check whether it 'disappears' into the underlying tissue. The swelling is not blanching if you can 'squash it flat', only if it actually disappears into an opening in the underlying tissue when pressed. Inguinal hernia is an example of a blanching swelling.

Is there a hernial canal?
If the swelling is blanching, or leads you to suspect a hernia (rupture) for some other reason, you can feel for a hernial canal. Feel along or through the swelling for edges in the underlying tissue. A hernial canal is an opening in the underlying tissue, which is what it feels like.

Crepitus
Crepitus is felt as a fine 'crackling' when palpating.

Auscultation
Place the membrane and/or bell of the stethoscope on the swelling and check whether there are any sounds, for bruit.

Transillumination
To check a swelling for transillumination, the area around it needs to be dark. The strength of the light source and the degree of darkness needed will depend on the size of the swelling, the thickness of the surrounding structures and the distance from the surface. Once the area is dark enough, shine a beam of light through the swelling from one side. Light transmission is visible as a red glow. If light transmission is visible we refer to the swelling as 'diaphanous' or 'translucent' (permitting the passage of light). Also compare this with the amount of light transmitted adjacent to the swelling.

Summary

Aspects that should always be examined
- Site (can usually be determined by inspection, but sometimes only by palpation)
- Pain/tenderness
- Size
- Shape
- Surface
- Consistency
- Relationship to the surrounding area
- Circumscription

Aspects that should only be examined when indicated
- Temperature
- Fluctuation
- Pulsation
- Blanching or reducible.
- Is there a hernial canal?
- Crepitus

Actions that can be taken when indicated
- Auscultation
- Transillumination

Palpatory characteristics of swellings

Site
The precise site of the swelling should always be determined. This is important when taking notes, so that anyone else reading them is in no doubt as to where the swelling is or was. Apart from that, it can tell you a lot about the possible diagnosis. An inguinal hernia is always in the groin; if a swelling is palpable in the liver it could be a hepatic metastasis or hepatic abscess, and so on.

Size
It is important to determine the size of the swelling so as to have a basis for assessing it. Once the current size is known it will be possible to monitor it properly in the patient, for example to gain an impression of the growth rate if it gets bigger. The growth rate provides information on the likelihood of it being malignant or benign. Also consider the information in the case history. A 5 cm swelling that the patient says he has had for only two weeks is more likely to be malignant than a 1 cm one that he has had for a year. Fast growth does not necessarily mean malignancy, however: after a trauma a swelling can form and grow very quickly, as can a cyst or pseudocyst filling with fluid. Other case history and palpatory information as well as growth rate will be needed to complete the information for diagnosis. The size should also be monitored, for example, if you want to find out what effect the treatment prescribed is having (e.g. a course of antibiotics for an inflammation).

Shape
The shape of a swelling provides information for the diagnosis. A cyst will normally be globular; a non-encapsulated tumour will often be erratic in shape; in the case of infiltrative inflammations the existing structure will become thicker while retaining its shape.

Surface
The surface of a swelling provides information for the diagnosis. A cyst will usually have a smooth surface, like a skin inflammation or one just under the skin, whereas a malignant tumour will often have an irregular surface.

Consistency
The consistency tells you something about the ‘material’ that the swelling is made up of, enabling you to gain an impression of the originating structure. The consistency depends on the material that the swelling is made up of: it will be hard if it is made up of bone or calcium, for example, in which case it could originate in a tubular bone. The consistency of a cyst is determined not only by the material that it is made up of but also by the amount of tension in its wall.

Relationship to the surrounding area
This provides information on the originating structure of the swelling and/or the extent of any growth into surrounding structures. A swelling will be attached to a particular layer or structure if it originates there or has grown into it. If the swelling is attached to the skin but mobile in relation to the underlying tissue it will originate in the epidermis or cutis.

Circumscription
Circumscription provides information for the diagnosis, as some swellings are sharply delineated, whereas others (with different causes) are not. A cyst or lymph node will often be circumscribed, whereas an inflammation will be much more difficult to delineate, like some tumours, for one thing because they may have grown into surrounding structures.

Pain/tenderness
A swelling will be painful or tender in three cases: if it is inflamed, if it has grown into a nerve, or if it causes major pressure on or compression of innervated structures. The latter occurs in the case of bone tumours, for example, where the pain is caused by stretching of the periosteum or growth into it.

Aspects that should only be examined when indicated

Temperature
You should determine the temperature if you have the impression that the swelling could be due to inflammation. This could be indicated by a variety of things: the case history (for example if it developed after a skin wound), redness on inspection, and indications from the standard aspects such as pain.

Fluctuation
You should check for fluctuation if, from the case history and the basic aspects examined, you suspect the swelling to be made up of encapsulated fluid. This can be the case with a cyst or an abscess. Basic aspects of this kind of swelling can include such things as globular shape and elasticity.

Pulsation
A swelling may pulsate if it lies up against an artery or originates in an artery. You should check whether the swelling pulsates especially if the site suggests it could be an aneurysm or a vascular anomaly. If a swelling pulsates but not expansively it will not be an arterial swelling but one up against an artery.

Blanching
You should check for blanching if the patient tells you that the swelling is not always there. This will usually be one that appears when the pressure increases. There is an opening (hernia) in a structural layer through which underlying tissue can bulge (a hernia sac, possibly with contents). The contents of a swelling of this kind can usually be pushed back through the opening. An example of a situation where the swelling will not be blanching is a trapped hernia, where the swelling will also be painful for the patient and the appearance will change. It is also useful to check whether a swelling is blanching if the site is a place where hernias are more likely to develop, e.g. the groin, navel or a scar.

Is there a hernial canal?
There will only be a hernial canal if there is a hernia, so you should not feel for a hernial canal unless there are indications of a hernia.

Crepitus
Crepitus occurs when air has spread in the subcutaneous structures. This can happen in the case of inflammation that causes gas to be formed, or where a lung is damaged. For example, in the case of a patient with a thoracic swelling who has had a drain to treat pneumothorax you should check when palpating whether there are crepitations.

Auscultation
You may be able to identify the contents of a swelling by auscultating it, for example intestinal sounds in the case of an umbilical hernia. If you have established that the swelling is an aneurysm by examining the other aspects you should also auscultate it. This does not help to differentiate between possible diagnoses, but you will want to know if any vascular sounds (bruit) are audible. You can also auscultate the swelling, or the organ containing it, as there may be increased blood flow due to the nature of the swelling. The increased blood flow can cause vascular sounds (for example, an enlarged thyroid in hyperthyroidism).

Transillumination
Transillumination is something that you should check for if you want to know more about the contents of a swelling. If the swelling could be made up of encapsulated clear fluid it is worthwhile to check for transillumination. In practice this is done most commonly in the case of swellings in the scrotum or testicles. Hydrocele is an example of a swelling that is diaphanous.

Appendix 2

Theory of Head and Neck Examination

Salivary glands
The salivary glands that can be palpated as part of a standard physical examination are the parotid gland (just in front of and below the external ear on the masseter muscle) and the submandibular gland (just in front of the angle of the mandible against the medial edge of the body of the mandible).

A normal, non-enlarged parotid gland is not usually palpable; sometimes a soft, somewhat lobed, flat structure can be felt. In that case the consistency will be slightly firmer than normal and the gland will be somewhat tender when palpated. The parotid gland is normally more or less immobile in relation to the surrounding area, unlike the submandibular gland.

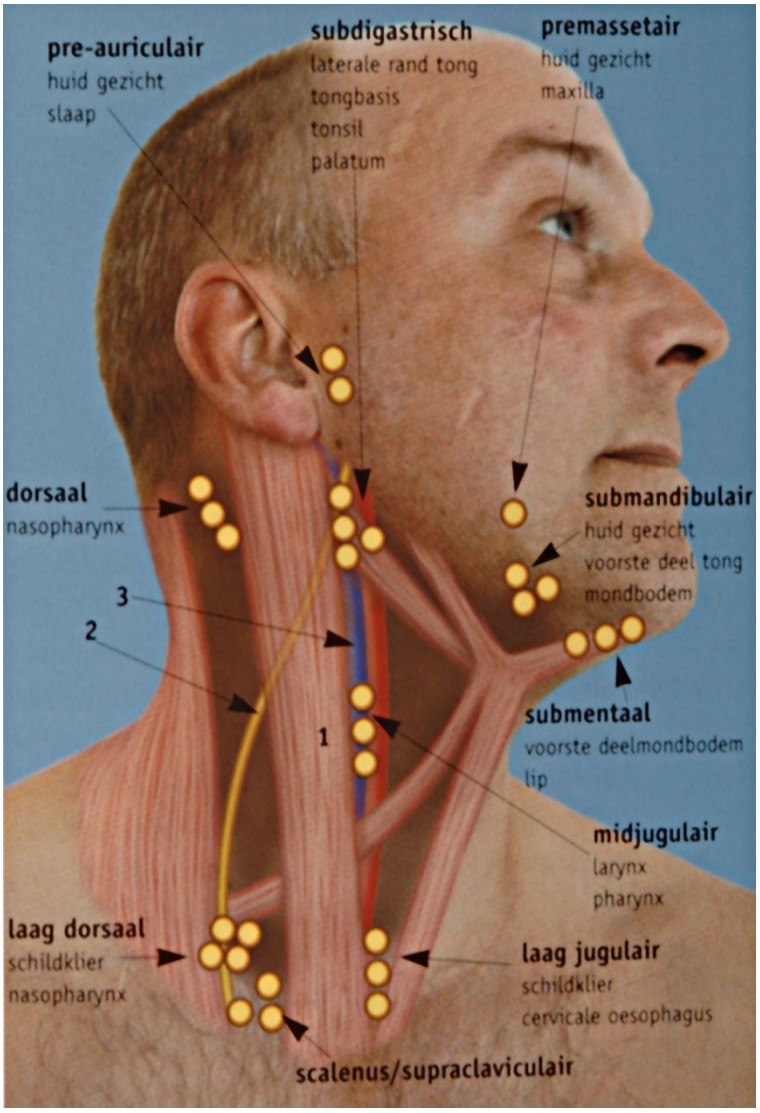
If there is a stone the parotid duct in particular will be severely dilated. The parotid duct passes through the buccinator muscle and opens into the mouth about five centimetres from the angle of the mouth. In this case the patient will usually be complaining of an intermittent painful swelling in front of one ear that has developed quickly and usually clears up spontaneously. Sometimes a hard resistance is palpable in the parotid duct.

In the case of a tumour originating in the salivary glands – usually the parotid gland – the classic presentation is a constant, painless swelling that has developed gradually in front of one ear. A firm or elastic, irregularly circumscribed swelling may then be palpable, surrounded by normal gland tissue. Sometimes this tissue is fused with the overlying skin or the underlying muscle tissue.

In a case of parotitis the salivary gland will be diffusely enlarged and tender when palpated, and the swelling will be clearly visible on frontal inspection.

Lymph nodes
The most important lymph nodes in the head and neck are supraclavicular, on either side of the sternocleidomastoid muscle, submandibular and occipital. The *left supraclavicular* node (also known as *Virchow's node*) is particularly important, as it lies in the drainage area of the thoracic duct. If this node is pathologically enlarged, the first thing to consider is a tumour where lymphogenic metastasis has taken place via the thoracic duct (stomach, pancreas, lung and testicle (!)). A normal lymph node is small (3-7 millimetres), smoothly circumscribed, elastic in consistency, not fused with the skin or the underlying tissue and not tender when palpated. It passes through the fingers when palpated. A normal lymph node in the neck is only just palpable.
Lymph nodes are often slightly reactively enlarged following an inflammation in the head or neck (the lymph nodes and ducts are more or less a kind of drainage system for the body to get rid of waste materials from inflamed tissues). In this case the lymph node will be somewhat larger and slightly firmer in consistency. Lymph nodes of this kind are palpable in the groin in most people. If there is active inflammation the lymph node will also be tender when palpated. Sometimes the skin over the lymph node will be red and warm to the touch. Also, the border between the inflamed lymph node and the surrounding subcutaneous fat will not be so clearly palpable. These phenomena are due to the inflammatory infiltrate that forms around the inflamed lymph node (see the classic signs of inflammation: redness, heat, pain, tumour and loss of function. If there is necrosis in the inflamed tissue we call it an abscess, and fluctuation can sometimes be induced. If the lymph node is enlarged as a result of a tumour the surface will usually remain smooth. Sometimes the lymph node will be irregular in shape, in which case the consistency will be firm. Sometimes the node will be fused with the skin or the underlying tissue, in which case the lymph node will *not* usually be tender when palpated. The description above includes abnormal findings on palpation of lymph nodes, but realize that a swelling in the lateral neck can also originate in other structures, for example a lateral neck cyst.

Fig. 1. Overview of lymph nodes and their drainage areas



The numbers in the figure refer to the:

1. Sternocleidomastoid muscle
2. Accessory nerve
3. External jugular vein

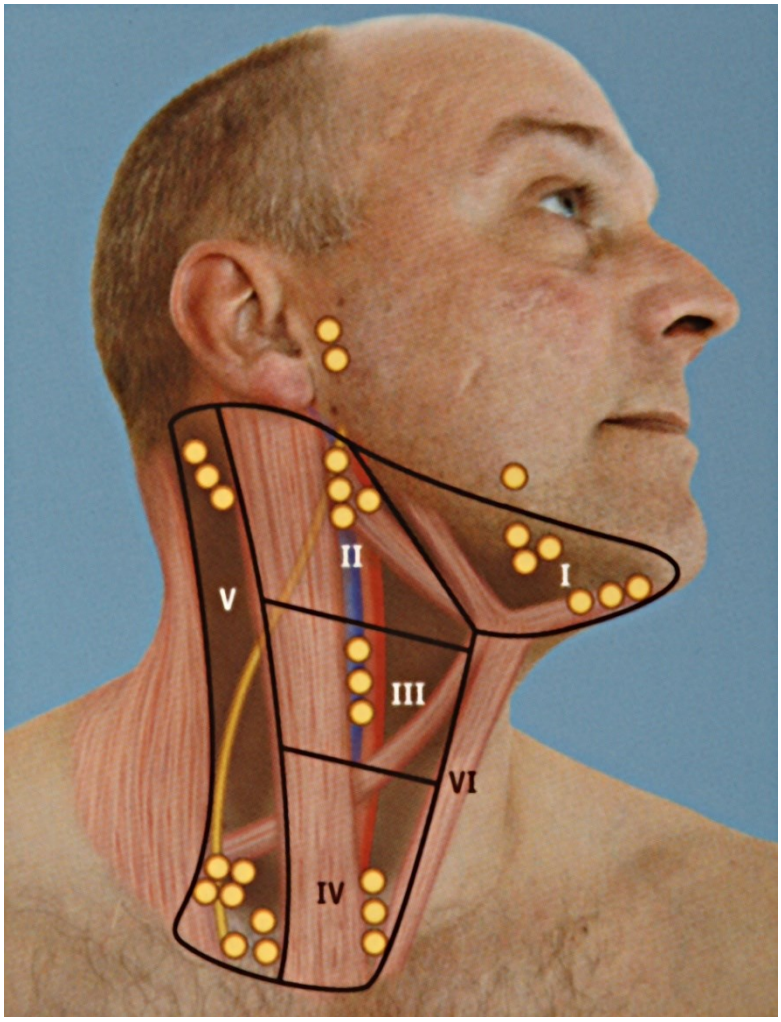


Fig. 2
The lymph nodes can also be classified into ‘levels’ (see the figure above). This classification is used in head and neck oncology to stage cervical gland metastases.

Trachea
The trachea is sited in the medial neck and is made up of pieces of cartilage which are easily recognizable. The most obvious piece of cartilage is the thyroid cartilage, which is particularly clear in men. Above this is the hyoid, a horseshoe-shaped bone, the ends of which in particular are easily palpable. Below the thyroid cartilage is the cricoid, below which seven rings of cartilage around the trachea are palpable. Below the thyroid cartilage is the cricoid or ‘signet ring cartilage’. The space between the thyroid cartilage and the cricoid is occupied by the cricothyroid ligament, and this is where an emergency tracheotomy is carried out if necessary. When palpating the trachea pay particular attention to its position in relation to the midline. Any lateral deviation may be an indication of a space-occupying process in the mediastinum that has displaced the trachea (a tumour metastasis or atelectasis of the right upper pulmonary lobe).

Thyroid
The thyroid gland is a small, flat, soft organ weighing about 20 grams sited between the manubrium sterni and the thyroid cartilage. Under normal conditions it is very soft and almost gelatinous in consistency, with a fine lobed surface. The surface is therefore somewhat less smooth than that of subcutaneous fatty tissue. A normal thyroid is likely not to be palpable. A diffusely enlarged thyroid is firmer in consistency and slightly more coarsely lobed. On inspection a swelling will often be visible between the thyroid cartilage and the jugular fossa (the small depression above the sternum), especially if you inspect the neck from the side. If a swelling is visible it will often be seen to consist of two halves on either side of the midline, corresponding to the two thyroid lobes. On auscultation you can sometimes hear bruit due to increased blood flow. If you feel any irregularities in the thyroid tissue you must describe them precisely. In a case of nodular/multinodular goitre you will feel one or more smoothly circumscribed elastic swellings which are not tender when palpated. If there is a malignant tumour the swelling will often be smooth, but sometimes irregularly circumscribed, firm in consistency, not tender when palpated, and sometimes fused with surrounding structures.

Carotid arteries
You will normally feel strong, elastic, regular pulsations against your fingertips. If there is extensive atherosclerosis the artery will be stiffer in consistency and the pulsations weaker. Sometimes a thrill can be felt and a systolic murmur heard on auscultation: these are indications of significant narrowing of the artery.

N.B. Inspection and examination of the jugular veins will be dealt with when discussing the examination of the cardiovascular system.

Temporal arteries
In giant cell arteritis (temporal arteritis) the temporal artery may feel thickened and stiff, be more twisty and warm, and be tender when palpated. The thickened, twisty artery is sometimes clearly visible if you examine the patient's head from the side under oblique illumination.

Description of the skills

General

As with all aspects of physical examination, you need to set about examining the head and neck as *systematically* as possible. Keep asking yourself why you are carrying out the physical examination (or this particular part of it), what information you want to garner, what medical question you want to answer. The actual order in which you carry out the examination is less important; the important thing is to develop a system for yourself so that you do not omit anything important. So make sure you follow a *fixed sequence* when carrying out your examination, as this will minimize the risk of overlooking something. You will eventually discover the order that makes most sense to you, but remember that as a general principle you should be examining the patient '*from top to toe*'.

Palpating the structures in the neck – except the carotid arteries – can best be done with you *standing behind the seated patient*. It is very important here to keep *comparing* corresponding areas *on the left and right*. Generally speaking, then, it is a good idea to start by palpating the right and left of the neck simultaneously (but see the note below!), and if you suspect an abnormality then palpate with one hand, holding the other hand against the contralateral side of the patient's head so as to provide some counterpressure. Using one hand enables you to concentrate better on the tactile information received through it than dividing your attention over two hands. It can sometimes be a good idea to rest the palm of the palpating hand on the patient's shoulder, as that hand is then more relaxed, which makes palpating easier. What you should avoid at all costs is palpating the paratracheal structures with both hands at the same time: if you do this you will be inadvertently massaging the carotid sinus, which can cause vasovagal collapse.

N.B. Realize that you are standing behind the patient, so he cannot see what you are doing. No-one likes being touched unexpectedly, so it is important to *explain clearly* to the patient what you are going to do before you start.

Inspection

Examination of the head and neck starts with inspection of that area. Stand or sit in front of the patient and check whether there are any visible swellings, whether the trachea is in the midline and whether the thyroid is visibly enlarged. Check the neck contours from the side as well. Also check the skin for abnormalities and scars, of course.

Palpating the salivary glands

Palpation of the salivary glands starts with the parotid gland. Place your hands just in front of the patient's ears, against the cheeks. Palpate with the volar side of the distal phalanges (the 'pads') of your fingers as far as possible, as this is the most sensitive part. Never palpate with your fingertips, as this is where the terminal branches of the interdigital arteries are, which impairs sensation. Palpate the area in front of the ear with fluctuating finger pressure, making small rotary movements. You should use this palpation technique for virtually all parts of the head and neck examination.

The submandibular gland can best be felt by placing the fingers against the body of the mandible and folding the distal phalanges around it. You will then feel a structure with the same consistency as the parotid gland but thicker.

If you get the patient to clench his jaws by tensing the masseter muscle you will be able to feel a thin, more or less horizontal, tubular structure in front of the parotid gland: this is the parotid duct.

Palpating the trachea
Palpating the structures in the trachea is easiest with you standing behind the seated patient. To find your way around it is best to locate the thyroid cartilage first so that you can find the other structures from there. Try to enclose the thyroid cartilage with your thumb, index finger and middle finger as if you are picking up a matchbox. The central notch in the thyroid cartilage can then be felt easily with your index finger. Above this is the hyoid, the ends of which are somewhat more to the side. They can be felt easily if you 'hold' the entire hyoid between your thumb and index finger. If you get the patient to stick his tongue out you will feel the hyoid moving up, as the base of the tongue is attached to it (hyoid = tongue bone). When palpating the trachea pay particular attention to its position in relation to the midline.

Palpating the thyroid gland
Palpation is carried out with you standing behind the seated patient, with both palpating hands on either side of the trachea. Your fingers must lie on the skin, but you must *not press too hard*, otherwise you will be pressing through the thyroid tissue and palpating the tracheal rings. Make small rotary movements with the palpating hand to enable you to assess the relationship between the skin and the underlying structures (the thyroid in this case). The thyroid tissue will feel 'tickly' against your fingers. Then ask the patient to swallow (get him to take a sip of water first if necessary and not swallow until you are ready). The thyroid tissue will move up as the patient swallows.

Palpating the carotid arteries
Palpation of the carotid artery can be carried out with the patient either seated or recumbent, but it should be done with care. The carotid arteries are medial to the sternocleidomastoid muscle, just lateral to the thyroid, and run approximately from the jugular fossa towards the angle of the mandible. Place your fingers on the thyroid cartilage and slide them down towards the side. You will feel the carotid artery pulsating just medial to the sternocleidomastoid muscle. Do not palpate too high up the neck (pressure on the carotid sinus can slow down the heart rate and lower the blood pressure). Never palpate both carotid arteries simultaneously!

Palpating the temporal arteries
The temporal arteries are sited on the temporal bone, just above the lateral edge of the eye sockets, and run more or less horizontally. Place the flat of your hand on the patient's temples so that they lie on the skin, without pressing too hard. Normally you will then feel the temporal arteries pulsating.

Palpating the lymph nodes in the head and neck
The most important lymph nodes in the head and neck are supraclavicular, on either side of the sternocleidomastoid muscle, submandibular and occipital. It is important to follow a fixed sequence when palpating them. One method is to start with the submental lymph node, then move towards dorsal with the palpating fingers, systematically palpating the submandibular and preauricular lymph nodes. You then move on to the retroauricular lymph nodes and the attachment of the sternocleidomastoid muscle, which is dorsal to the ear, going down over the front of this muscle towards caudal, passing the subdigastric and the upper, middle, and lower jugular lymph nodes in that order. You then palpate the paratracheal lymph nodes. These are followed by the supraclavicular lymph nodes, which you palpate by pressing the fingers of the palpating hand deep behind the clavicle, next to the attachment of the sternocleidomastoid muscle, while the patient takes a deep breath and raises his shoulders. Next you move up along the back of the sternocleidomastoid muscle, finishing up on the occiput, where the dorsal and occipital lymph nodes are situated. Here again it is best to start by palpating both sides simultaneously, and if you suspect an abnormality then palpate with one hand, holding the other hand against the contralateral side of the patient's head so as to provide counterpressure.

In the description above the sternocleidomastoid muscle is used as a guide to palpation. If you find it difficult to locate this muscle you can make it visible by getting the patient to turn his head to one side (i.e. rotate it, not flex it) away from the side that you are examining, while you provide counterpressure against the contralateral side of the head with your other hand. This tenses the sternocleidomastoid muscle so that its outline can be clearly seen.

Summary

Head and neck examination

Inspection: swellings, trachea and thyroid

Palpation

Salivary glands	Size Consistency Pain?
trachea	-Position
Thyroid	- Size - Shape - Consistency - Homogeneity - Pain/tenderness
carotid arteries	- Pulsation - bruit
temporal arteries	
Lymph nodes	- Submental - Submandibular - Pre/retroauricular - Occipital - Supraclavicular - Superficial and deep cervical

Appendix 3

Head and Neck Examination Checklist

Prior to the examination
Greet the patient.
Explain the examination and the reason for it.
Give undressing instructions.
Remove jewellery, wash hands.

Inspection
(also from the side)
Swellings
Trachea
Thyroid

Palpating other structures
Salivary glands: parotid gland, submandibular gland
Hyoid, thyroid, cricoid, trachea (assess position)
Thyroid (ask the patient to swallow)
Carotid arteries (not on both sides at once)
Temporal arteries

Palpating lymph nodes
Submental
Submandibular
Pre/retroauricular
occipital
Supraclavicular
Superficial and deep cervical

Palpation technique
Fingers parallel to the skin, correct amount of pressure, etc.

During the examination
Explanation during the examination
Instructions on posture and breathing
Close observation
Eye etc. contact with the patient
Communicate well and use the correct techniques'.

After the examination
Announce that the examination is over.
Give dressing instructions.
Conclude the examination and present the findings.
Wash hands.

General
Displays knowledge of the skill.

Appendix 4

Palpating a Swelling Checklist

Prior to the examination
Greet the patient.
Explain the examination and the reason for it.
Give undressing instructions.
Remove jewellery, wash hands.

Palpation technique
Fingers parallel to the surface
Palpate superficially first, then deeply

Describing the swelling
Site
Pain/tenderness
Size
Shape
Surface
Consistency
Relationship to the surrounding area
Circumscription

During the examination
Explanation during the examination
Give instructions on position.
Close observation
Eye etc. contact with the patient
Communicate well and use the correct techniques'.

After the examination
Announce that the examination is over.
Give dressing instructions.
Conclude the examination and present the findings.
Wash hands.

General
Displays knowledge of the skill.

Ci-A Session General Internal Problems

Duration
2 hours

Structure
15 min. for Socratic questioning
15 min. for Case 1
20 min. for postmortem discussion
15 min. for Case 2
20 min. for postmortem discussion
15 min. for Case 3
20 min. for postmortem discussion

Learning outcome
Students are able to take a history, pose questions to test their hypotheses and draw up a differential diagnosis.
Students are able to formulate any abnormal findings from physical examination.

Student tasks
Preparation
Work up the doctor's role for Cases 1-3.
Study the study material.
Students are assumed to have the knowledge they gained in the First three years. *The study material also includes the diagnoses in the differential diagnosis.*
The students who have been assigned the patient role prepare for this.
At the session
Participating in role-play and reflecting and receiving feedback on this

Study material

1) **Medical Consultation: general principles and background**
2) **Kumar and Clark's clinical medicine. 8th edition**
3) **Kumar and Clark's clinical medicine. 9th edition. Chapter 17 .page 606 - 626; Chapter 18 .pages 672-690 & 692 - 699 Chapter 26 .page 1199-1212**

Appendices
1. Cases 1-3

Appendix 1

Assignment

Work up the doctor's role for Cases 1-3. Prepare the questions you intend to ask to identify the main health issue and for the specific history. What questions do you intend to ask to test your hypothesis? Draw up a DD and list possible abnormalities that you would expect to find in the physical examination.

Case 1

Setting:	You are an intern and attend Ms Doaa who has been admitted to hospital for surgery: her gall bladder is to be removed laparoscopically because of gallstones. You need to take her history.
Patient data	Ms Doaa, Age 36
Main health issue:	Bouts of upper abdominal pain due to gallstones
Care request:	Gall bladder removal
History:	One Caesarean section, otherwise normal
Case history:	Bouts of upper right abdominal pain for the past six months. While taking her history you notice that her neck is swollen.
Context factors:	Works as a teacher, lives with husband and three children.

Case 2

Setting:	GP practice
Patient data:	Hani, age 16
Main health issue:	Multiple lumps in the neck
Care request:	Would like to know what it is.
History:	history of repeated attacks of URTI at age of 7 year
Case history:	Noticed multiple lumps in the neck bilaterally yesterday when her mother was massaging his head.
Medication:	None
Intoxications:	NIL
Context factors:	Nothing significant.

Case 3

Setting:	GP practice
Patient data	Mrs Salma, age 36
Main health issue:	Flu symptoms
Care request:	Course of antibiotics
History:	Pfeiffer's disease at the age of 18 Raynaud's phenomenon since the age of 35
Medication:	None
Context factors:	Works in a furniture store, married with two children aged 12 and 6.

CC Session GIT /General Internal Problems

Type
Complete consultation session with simulation patients

Duration
Session: 3 hours

Learning outcome
Students are able to conduct a complete consultation with a simulation patient. All the phases of the consultation should be dealt with.

Student tasks
Preparation
Study the study material. Students are assumed to have the knowledge they gained in the First three years. Study the checklists so far.

Four students conduct a consultation with a simulated patient. Prepare for this. Take all the equipment you need with you, e.g. a stethoscope. Dress appropriately. Introduce yourself to the simulation patient. As regards subject matter, you are expected to have prepared by knowing the required skills such as history-taking and physical examination. You should also be able to put forward a proposal on treatment strategy in the context of the week's theme.

At the session
Active participation in the CC session: in the role of intern conducting the consultation, and as a listener giving feedback.

Study material
Study the material from previous Ci and PS sessions. In particular topics in endocrinology, haematology, oncology, rheumatology and infectious diseases.

Equipment to be taken along by students
Reflex hammer
Stethoscope
Penlight

Appendices
1. Feedback list for the CC session

Appendix 1

Feedback list for the CC session

The teacher (playing the doctor) follows the following steps in the order shown in each consultation:

1. The student doctor says how many clinical rotations he/she has already done. The teacher passes on this information to the simulation patient.
2. The student doctor lists the learning points mentioned after previous consultations.
3. The consultation takes place.
4. The student comments on how he has conducted the consultation and lists the aspects on which he would like feedback.
5. Feedback from the simulation patient
6. Feedback from the student observers. The teacher asks the students who observed to respond.
7. If so desired: the student responds to the feedback at 5 and 6.
8. Feedback from the teacher
9. The student formulates learning points.