МИНИСТЕРСТВО ЗДРАВООХРАНЕНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ

УЧРЕЖДЕНИЕ ОБРАЗОВАНИЯ
«ГОМЕЛЬСКИЙ ГОСУДАРСТВЕННЫЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ»

Кафедра анатомии человека
с курсом оперативной хирургии и топографической анатомии

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ТИПЫ СОЕДИНЕНИЯ КОСТЕЙ: ОПИСАНИЕ И СХЕМЫ

Рекомендовано учебно-методическим объединением
по высшему медицинскому, фармацевтическому образованию
в качестве учебно-методического пособия для студентов
учреждений высшего образования,
обучающихся по специальности 1-79 01 01 «Лечебное дело»

TYPES OF BONES ARTICULATION: DESCRIPTION AND SCHEMES

Репозиторий ГомГМУ

Гомель
ГомГМУ
2021

УДК 611.72(075.11)=111
ББК 28.706я73=432.1
К 82

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Крицкая, А. Н.
К 82 Типы соединения костей: описание и схемы: учеб.-метод. пособие = Types of bones articulation, description and schemes: Educational and methodical manual / А. Н. Крицкая, Т. И. Горбачёва, В. Н. Жданович. — Гомель: ГомГМУ, 2021. — 116 с.
ISBN 978-985-588-220-7

Учебно-методическое пособие разработано для подготовки к практическим занятиям и экзаменам по дисциплине «Анатомия человека». Содержит основные сведения по разделу «Артрология» и соответствует требованиям современного образовательного стандарта по подготовке специалистов для зарубежных стран по специальности «Лечебное дело».

Предназначено для студентов 1 и 2 курса факультета иностранных студентов, обучающихся на английском языке, учреждений высшего медицинского образования.

УДК 611.72(075.11)=111
ББК28.706я73=432.1

ISBN 978-985-588-220-7

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LIST OF ABBREVIATIONS

Art.	— articulatio
Artt.	— articulationes
AS	— articular surfaces
E.g.	— for example
Fig.	— figure
Lig.	— ligamentum
Ligg.	— ligament
M.	— muscle
MM.	— muscles
S.	— sutura
Ss.	— suturae
&	— and

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PREFACE

The loco motor system is formed by two parts: the active part — the muscles and the passive part — the bones and joints. This manual reflects the most important questions and main points related to anatomy of the passive part of loco motor system, namely arthrology, or joints. The information is presented in the short and the most convenient and understandable form to make the process of studying easier and more effective. The tables give main information about each joint that are necessary to remember for doctors and give an opportunity to revise briefly necessary information at the same time giving full description of the issue. At any time the student can refer to the manual to find the answer to the required question. The 2nd part of the manual is intended to make students think in different way, to find answers fast and take responsibility for their own decisions and also aimed to help in developing clinical way of thinking.

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1. INTRODUCTION

The concept of planes and axes is used to identify the human body‟s position in the space, location of its parts relative to one another.

The *anatomical position* is used by anatomists and physiologists looking at the human body from this standard starting point.

Anatomical position:

• most widely used & accurate for all aspects of the body;

• person stands straight with feet together and the face turned forward;

• limbs are at the sides of body;

• palms are faced forward.

Fundamental position: is essentially same as anatomical position except hands that are at the sides & palms facing the body.

A ***plane*** is an imaginary flat surface that passes through the body in order to describe the location of structures or the direction of movements.

A ***section*** is one of 2 halves (pieces) that results when the body has been divided by a plane passing through it.

The three major anatomical planes are:

• ***Frontal plane*** lies vertically and divides body into *anterior (frontal)* and *posterior (dorsal)* parts.

• ***Sagittal plane*** lies vertically and divides the body into *left (sinister) and right (dexter) sides*.

• ***Transverse plane*** runs horizontally and divides body into *superior (upper) and inferior (lower)* parts.

All three planes are perpendicular to each other.

The human body is also divided by anatomical axes:

Axis is a direction (conditional rod), which allows to orientate anatomical structures relative to the body‟s position.

Axis of rotation is an imaginary spine that passes through a joint or the body to describe their movement.

Three anatomical axes are:

• ***The vertical (longitudinal) axis*** runs straight from upwards to downward through the body or joint (ex.: from the top of the head downwards between the feet).

• ***The horizontal (transverse) axis*** runs from the left to the right.

• ***The sagittal* axis** runs from the front to the back.

All three anatomical axes are perpendicular to each other.

There are different types of movements that are possible to perform around anatomical axes.

Around the vertical (longitudinal) axis ***rotation*** *is performed:*

• medial rotation is called ***pronation,*** it rotates the bone inwards;

• lateral rotation is called ***supination,*** it rotates the bone outwards.

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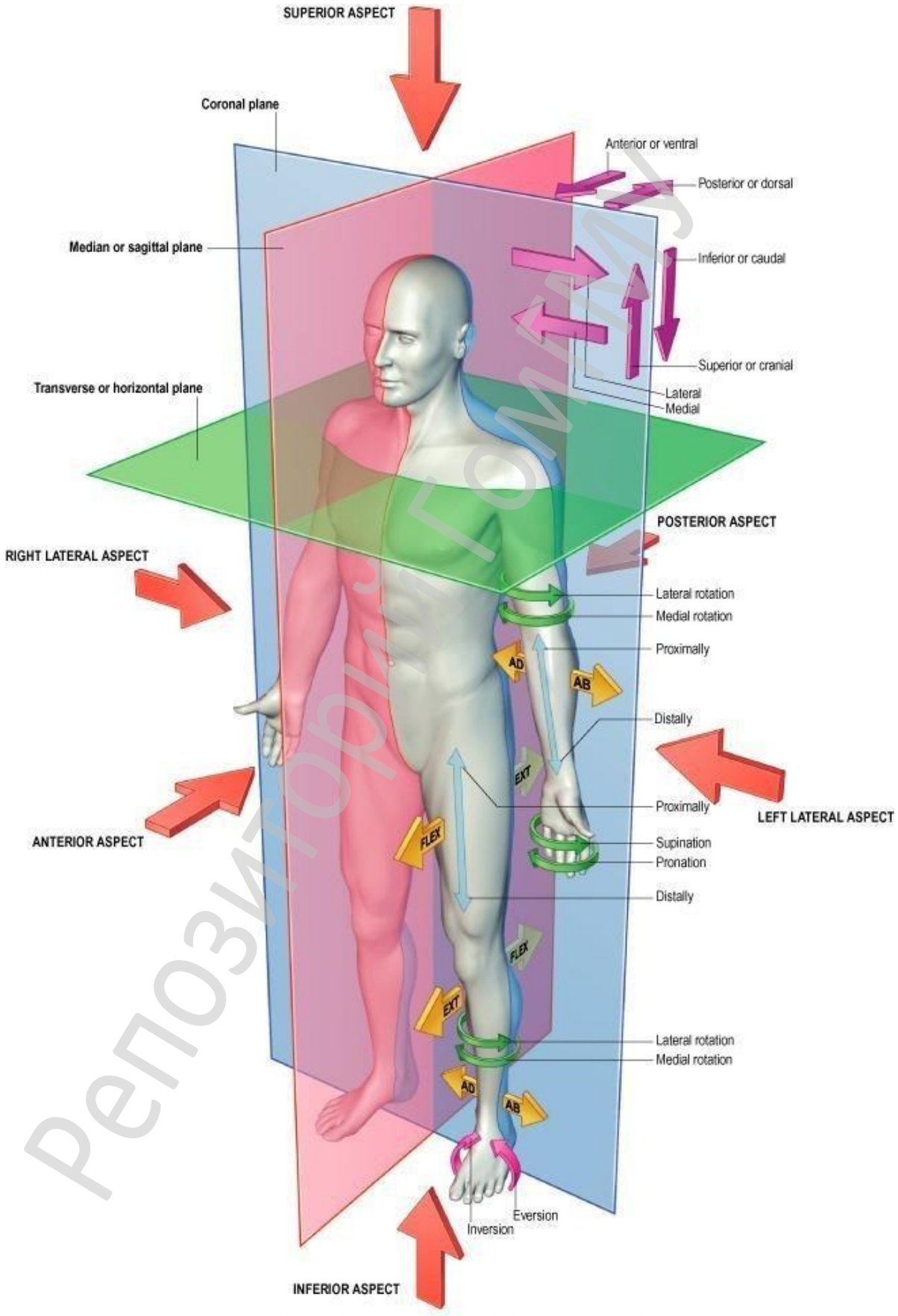

Figure 1.1 — Axes, planes and movements

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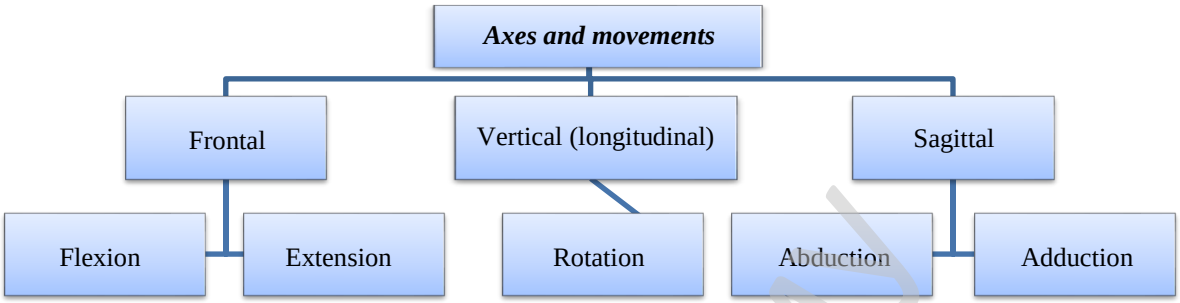

Figure 1.2 — Axes and movements

Around the horizontal (transverse) axis next movements are performed:

• ***Flexion*** is a movement that decreases the angle between two body parts involved in formation of joint.

• ***Extension*** is a movement that increases the angle between two body parts involved in formation of joint, in other words it straightens a joint and returns a body part to the anatomical position from flexion.

• ***Hyperextension*** is an extension of a joint beyond 180 degrees.

Around the sagittal axis next movements are performed:

• ***Abduction*** is a movement of a body part away from the midline (raising the arm to the side).

• ***Adduction*** is a movement of a body part back towards the midline from abduction position.

Around the frontal plane next movements are performed:

• ***Elevation*** is a movement that raises a body part vertically (moving away from the anatomical position).

• ***Depression*** it is a returning back to anatomical position from elevation.

• ***Circumduction*** (circular motion) is a type of movement in which one end (proximal) of appendage remains stationary while the other end (distal) makes a circular motion. It consists of a combination of flexion, extension, abduction and adduction.

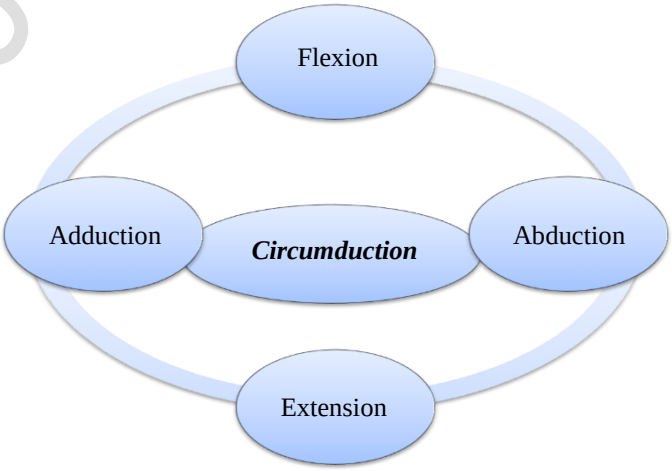

Figure 1.3 — Circumduction

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2. BONE'S ARTICULATIONS

In the process of phylogenesis two types of bone joining were developed: the compact joining with a limited range of movements and an interrupted type allowing wide movements. In reflection of this phylogenetic process the man also goes through these two stages. At first the skeletal germs are connected to each other by layers of mesenchyme. Then the mesenchyme transforms into connective tissue from which the bone-joining apparatus develops. If the areas of connective tissue located between the bones are compact, then a compact ***contiguous joining***, or ***synarthrosis*** occurs. If a cavity forms between these areas as a result of resorption, then an interrupted type forms, and is called ***diarthrosis***. Between these two forms there is a transitional form, from contiguous to interrupted, which is characterized by the presence of a small gap which does not have the structure of a true articular cavity, and it is called a ***half-joint***, or ***hemiarthrosis,*** or ***amphyarthrosis***.

If connective tissue remains between joining bones after birth, the joint is called fibrous, or syndesmosis. They can be divided into four types:

1. Interosseous membrane (membrane interossea) is the connective tissue, which fills a large space between the joining bones (e.g. between the bones of forearm or leg).

2. Ligaments (ligamenta) are the fibrous bundles between the bones. In some places the ligaments are composed of elastic tissue, called synelastosis, (e.g. ligg. between vertebral arches). There are long and short bundles, called long and short ligaments.

3. Fontanelles (fonticuli) are wide membranes that are remnants of primary nonossified connective tissue between the bones of a fetus, or a newborn`s skull.

The presence of fontanelles is of high functional importance because the bones of the skull can be displaced considerably as the skull adapts to the shape and size of the birth canal.

4. Sutures (suturae) are present where the intermediate connective tissue formes a thin layer between the connecting bones. According the shape of neighboring bones and shape of their margins the sutures are classified:

— serrate (sutura serrate) e.g. between parietal bones — sutura sagitalis, or between frontal and parietal bones — suturs coronalis, or beween occipital and parietal bones — sutura lambdoidea;

— squamous (sutura squamosa) e.g. between temporal and parietal;

— plane (sutura plana) e.g. between bones of facial cranium.

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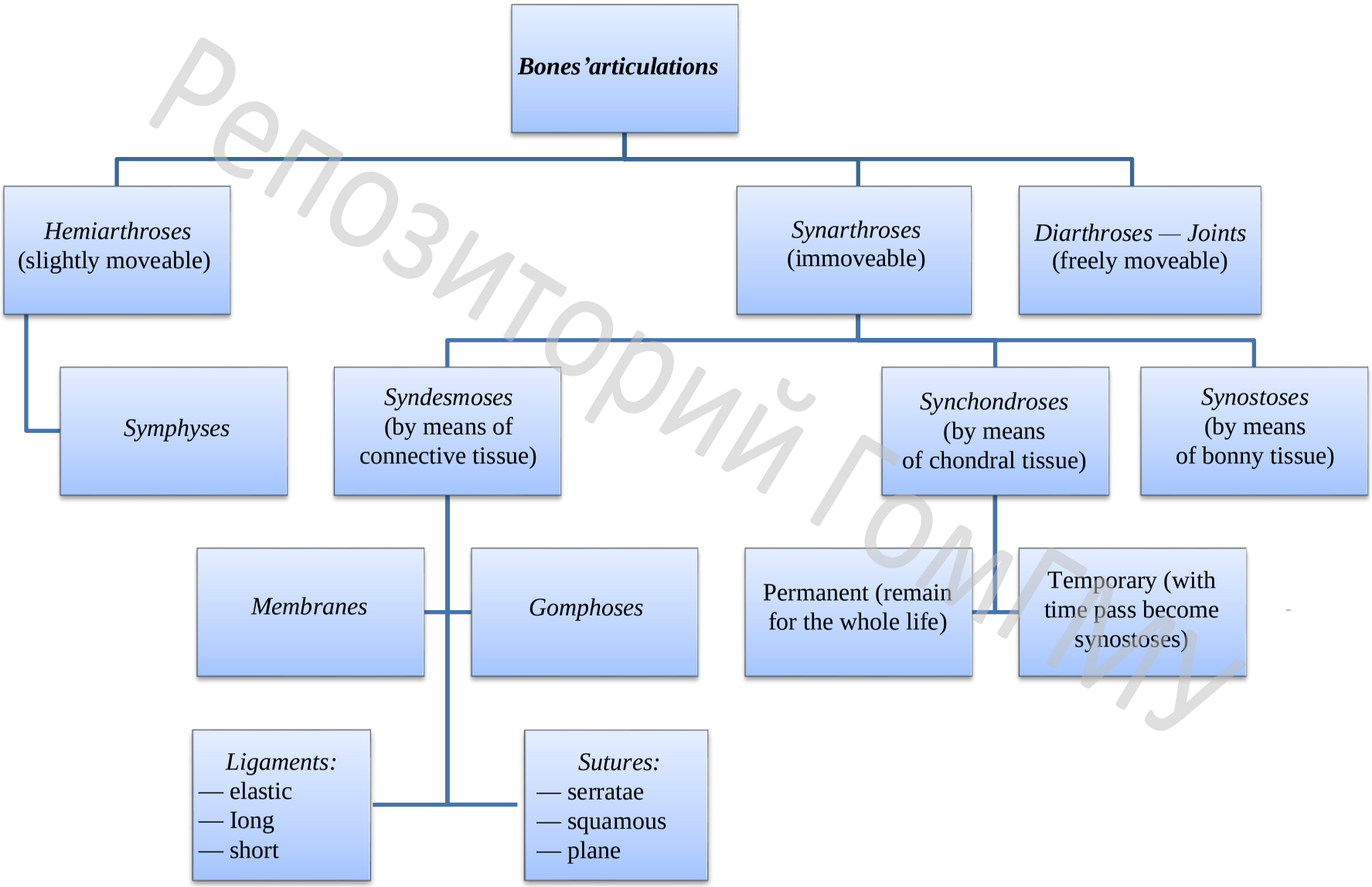

Figure. 2.1 — Bone"s articulation

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3. JOINT STRUCTURE

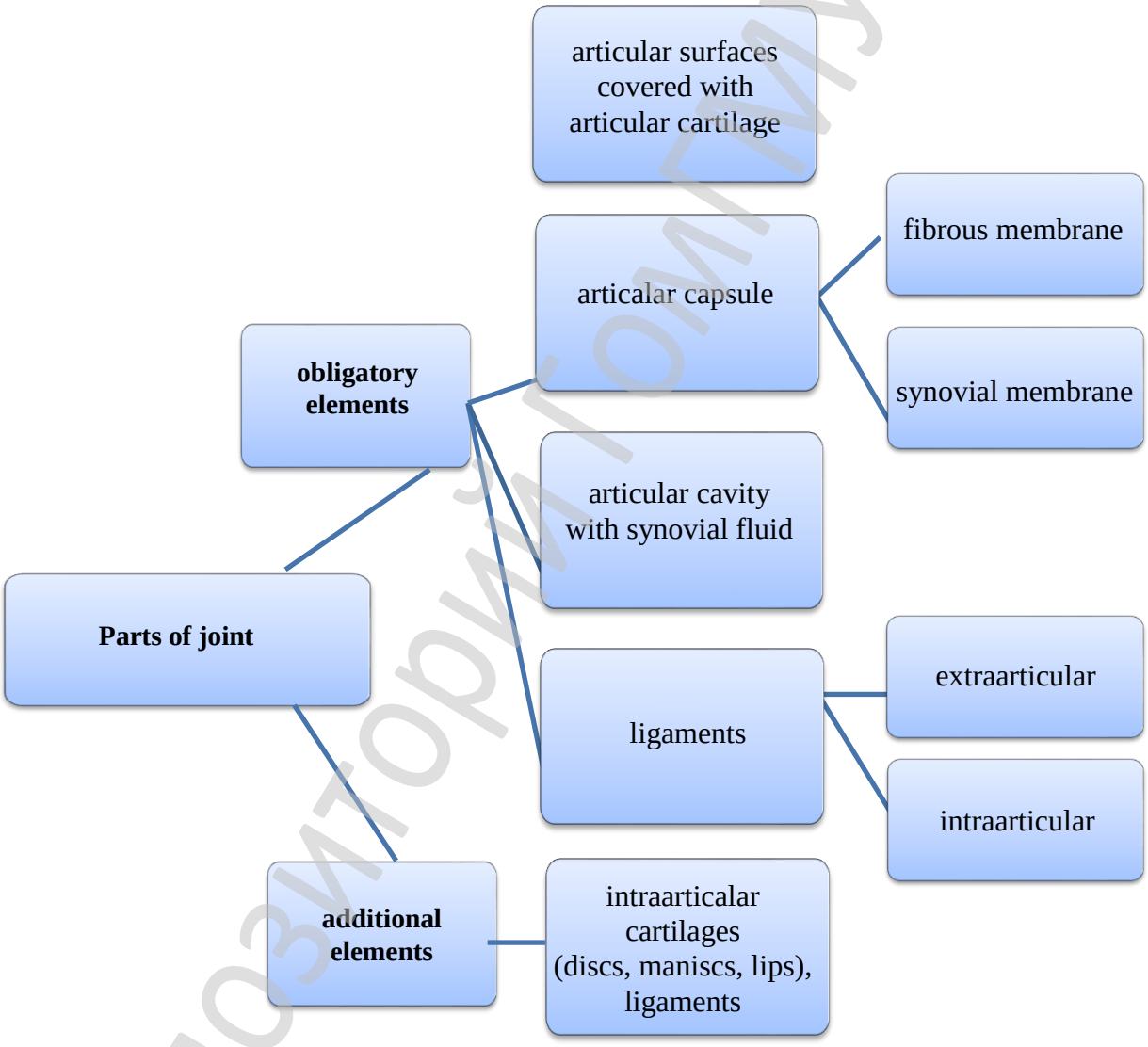

Figure 3 — Joint structure

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4. CLASSIFICATION OF JOINTS

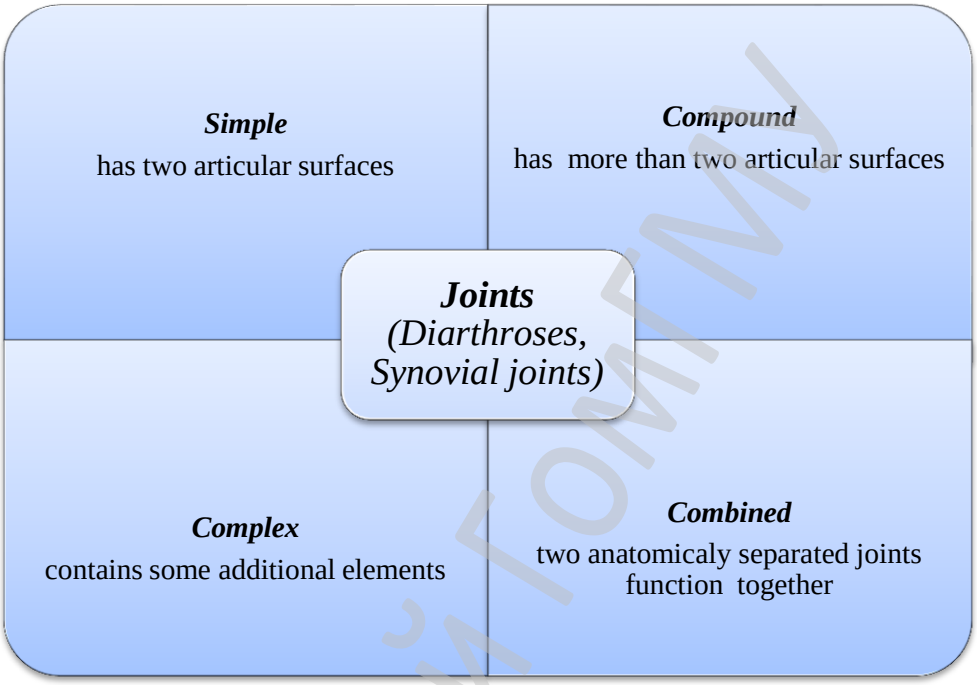

Figure 4.1 — Anatomical classification of joints

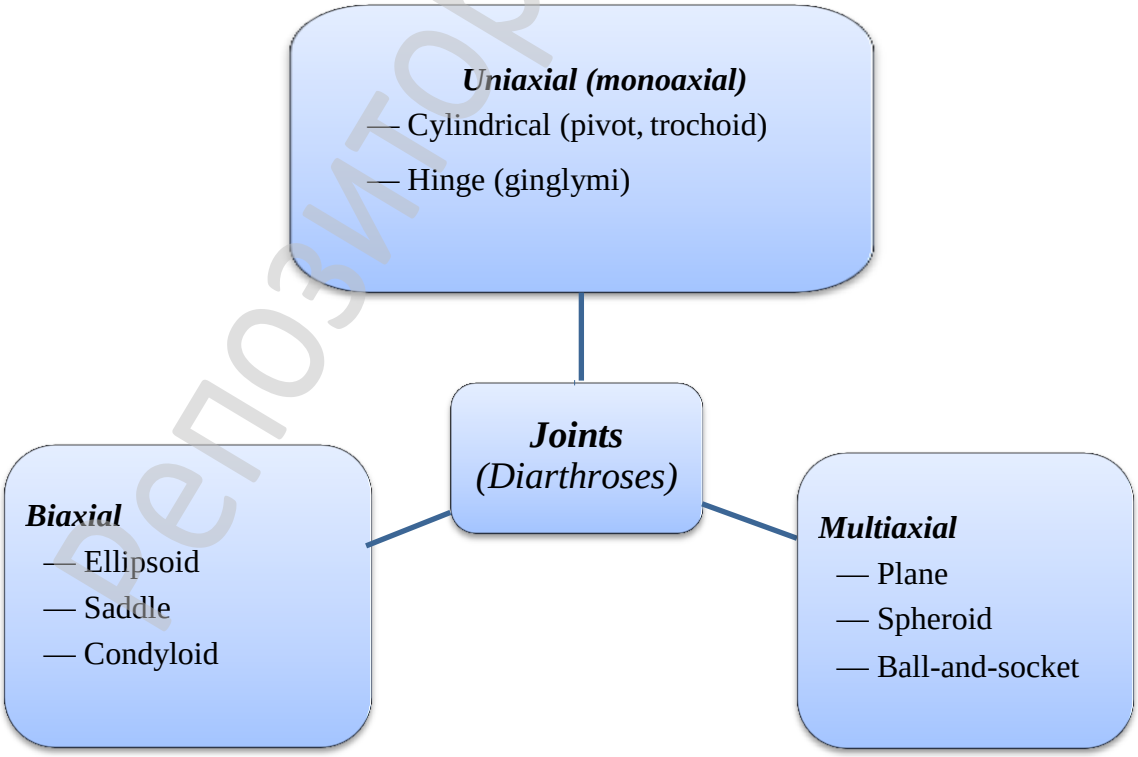

Figure 4.2 — Biomechanical classification of joints

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5. ARTICULATIONS WITHIN BONES OF THE SKULL

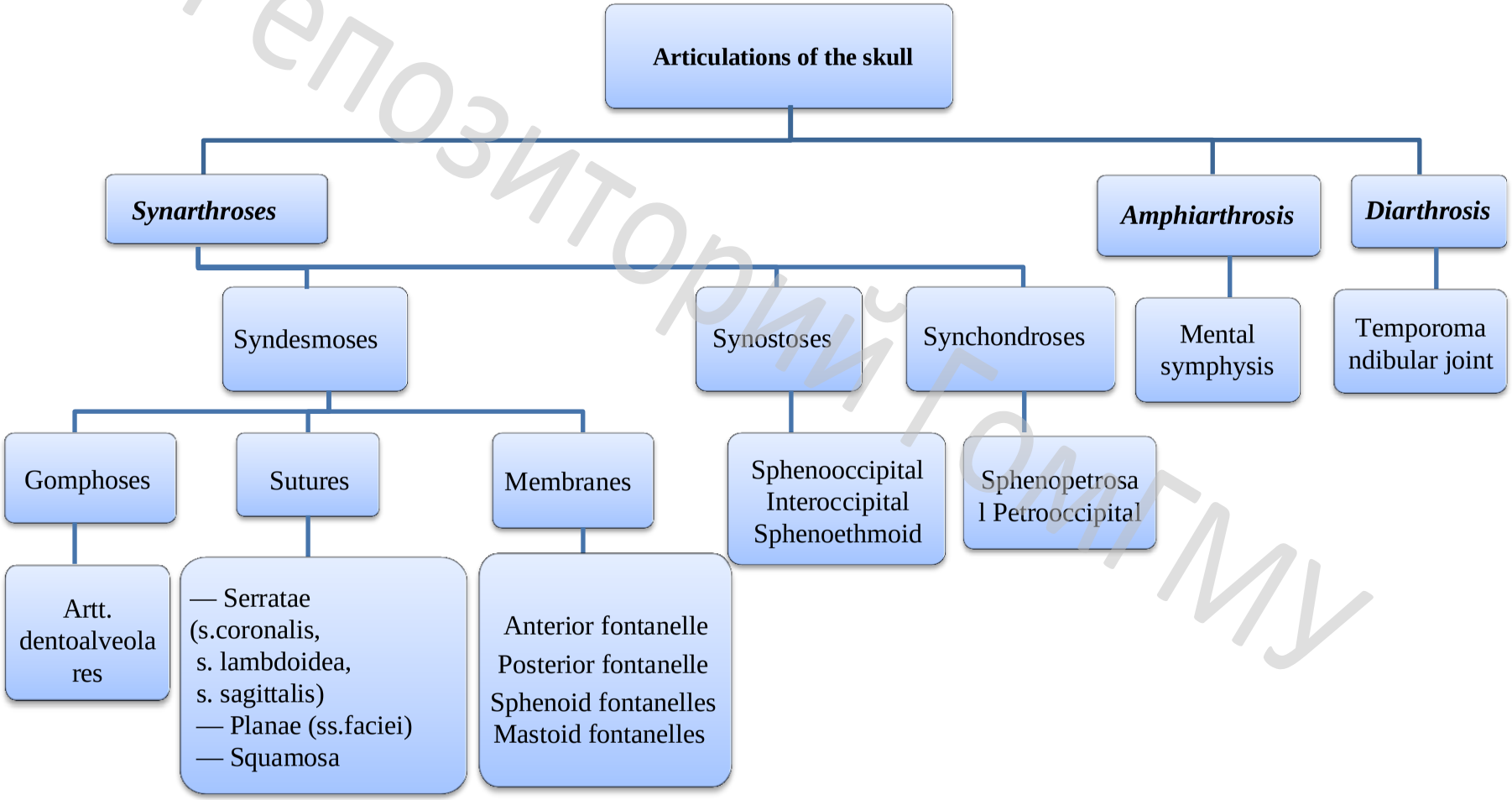

Figure. 5.1 — Articulations of the skull

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Gomphosis is a type of teeth connection with jaws. Tooth is «held in place» by fibrous periodontal ligament made of collagen that originates from the jaw bone. Fibrous «joint» permits slight movement when biting.

Sutures are immovable fibrous joints that bind attach the bones of the skull to each other:

• ***Serrate sutures*** appear as interlocking wavy lines (coronal, sagittal, lambdoid sutures).

• ***Squamous sutures*** are 2 bones with overlapping beveled edges (temporal and parietal bones).

• ***Plane sutures*** have straight, non-overlapping edges (palatine processes of the maxillae).

The fontanelles are the characteristic feature of a newborn‟s cranium.

• ***The anterior fontanelle*** *(fonticulus anterior)* is located at the intersection of sagittal, frontal and coronary sutures, or between frontal and parietal bones; it closes in the 2 year of life.

• ***The posterior fontanelle*** *(fonticulus posterior)* is found between two parietal bones and squama of the occipital bone; it closes in the 2 month of life.

• Two ***sphenoid fontanelles*** *(fonticulus sphenoidalis)* are found at the junction of the sphenoid angle of the parietal bone, the greater wing of the sphenoid bone and the squama of the temporal bone; it closes in the 2–3 month of life.

• Two ***mastoid fontanelles*** *(fonticuli mastoidei)* are located between the mastoid angle of the parietal bone, the base of the petrous part of the temporal bone and the squama of the occipital bone; it closes in the 1–2 month of life.

Mental symphysis is a fibrocartilaginous union of two halves of the mandible in the fetus. It becomes an ossified union during the first year.

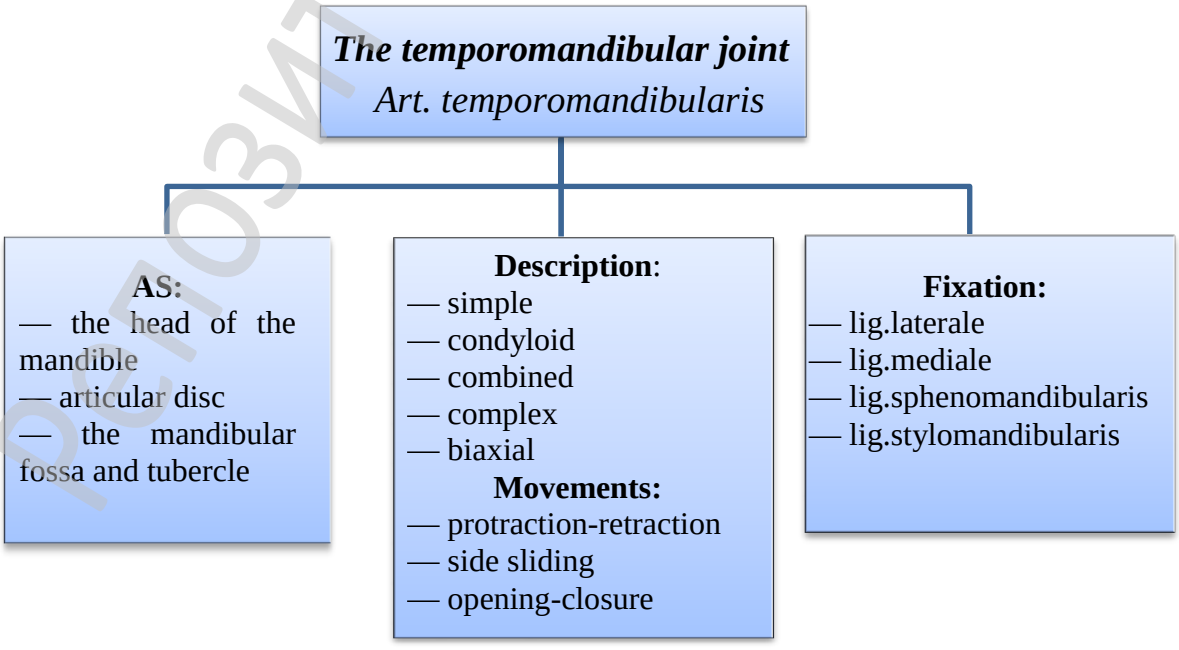

Figure 5.2 — The temporomandibular joint

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The articular surfaces of the bones never come into contact with each other because they are separated by an *articular disk.* Presence of such a disk completely divides the temporomandibular joint into two chambers, each lined by a synovial membrane. The articular disc articulates with the mandibular fossa of the temporal bone above and the condyle of the mandible below. From front to back the articular disc consists of an anterior lig. (connective tissue), an intermediate zone (fibrous cartilage), a posterior lig. (connective tissue), and a bilaminar zone (connective tissue). The articular surfaces of the bones are covered by fibrous cartilage.

The lateral ligament *(lig. laterale)* runs above of the articular tubercle of the zygomatic process of the temporal bone to the neck of the condylar process of the mandible. It is a thickening of the joint capsule, and acts to prevent posterior dislocation of the joint.

The medial ligament *(lig. mediale)* passes from the inner articular surface and base of spine of sphenoid bone to the inner posterior surface of neck of the articular process. It's an intracapsular bundle of fibers strengthening the medial part of the articular capsule of the temporomandibular joint. It's not as apparent as the lateral ligament.

The sphenomandibular ligament *(lig. sphenomandibulare)* passes from the sphenoid spine to the mandibular lingula.

The stylomandibular ligament *(lig. stylomandibulare)* passes from the styloid process to the inner surface of the angle of mandible. It is a thickening of the fascia of the parotid gland. Together with the facial muscles, it supports the weight of the jaw.

There is ***the pterygospinal lig.*** *(lig. pterygospinale)* in the temporomandibular joint, that doesn`t affect the joint but has a stabilizing function. It starches from the spina ossis sphenoidalis to the lamina lateralis of pterygoid process.

Movements of the temporomandibular joint

The upper part of the joint allows ***protrusion and retraction*** of the mandible that are the *anterior and posterior movements* of the jaw respectively.

Lateral excursion is a sideways movement to the right or to the left.

Medial excursion is a movement back to the midline.

Side-to-side grinding movements occur during chewing and is a composition of sideway movements, medial and lateral excursion, called laterotrusion and mediotrusion respectivelly.

The lower part of the joint permits ***elevation and depression*** of the mandible that are opening and closure movements (also called abduction-adduction).

The ligg. laterale and mediale inhibit posterior movements of the mandibular head.

Both ligaments (the stylomandibulare lig.and the sphenomandibulare lig.) inhibit lower jaw to the maximal opening.

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6. UNION OF THE SKULL WITH THE SPINE

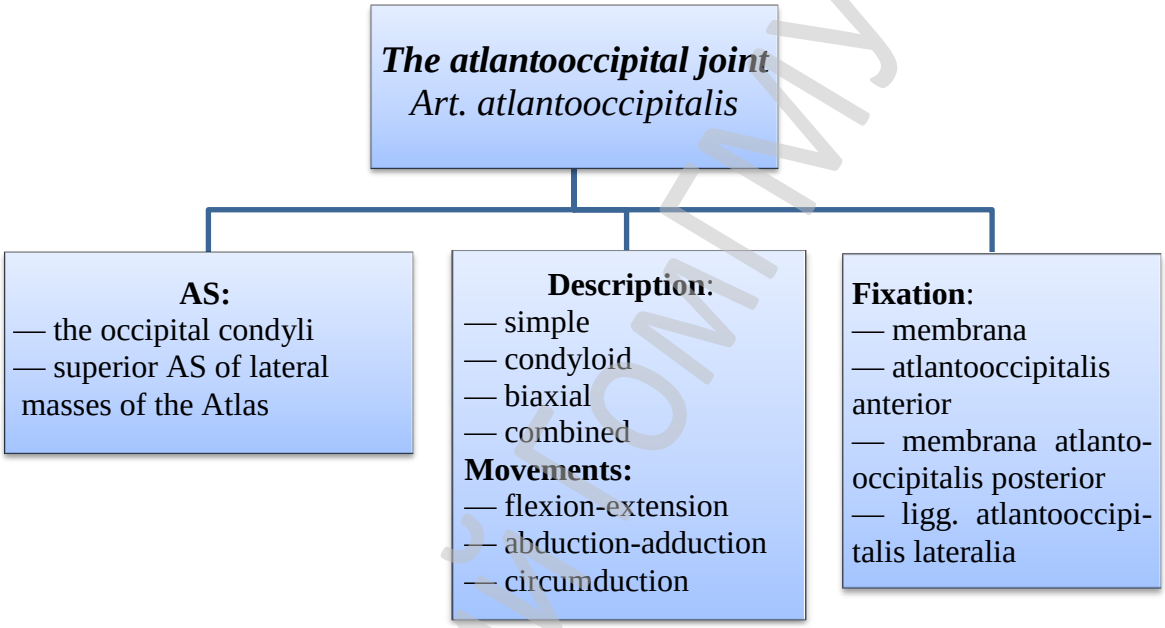

Figure 6.1 — The atlantooccipital joint

The anterior atlantooccipital membrane *(membrane atlantooccipitalis anterior)* passes from anterior arch of the atlas to the anterior border of the foramen magnum.

The posterior atlantooccipital membrane *(membrane atlantooccipitalis posterior)* passes from posterior arch of the atlas to the posterior border of the foramen magnum.

The lateral atlantooccipital ligaments *(ligg. atlantooccipitalis lateralia)* are thickened portions of the articular capsules, reinforced by bundles of fibrous tissue, and are directed obliquely upward and medially. Ligaments pass from the bases of the transverse processes of the atlas to the jugular processes of the occipital bone.

The atlantoaxial joint

The alar ligaments *(ligg. alaria)* pass from the lateral surfaces of the dens to the medial surfaces of the occipital condyles.

The apical ligament of dens *(lig. apicisdentis)* passes from the apex of the dens to the anterior border of the foramen magnum.

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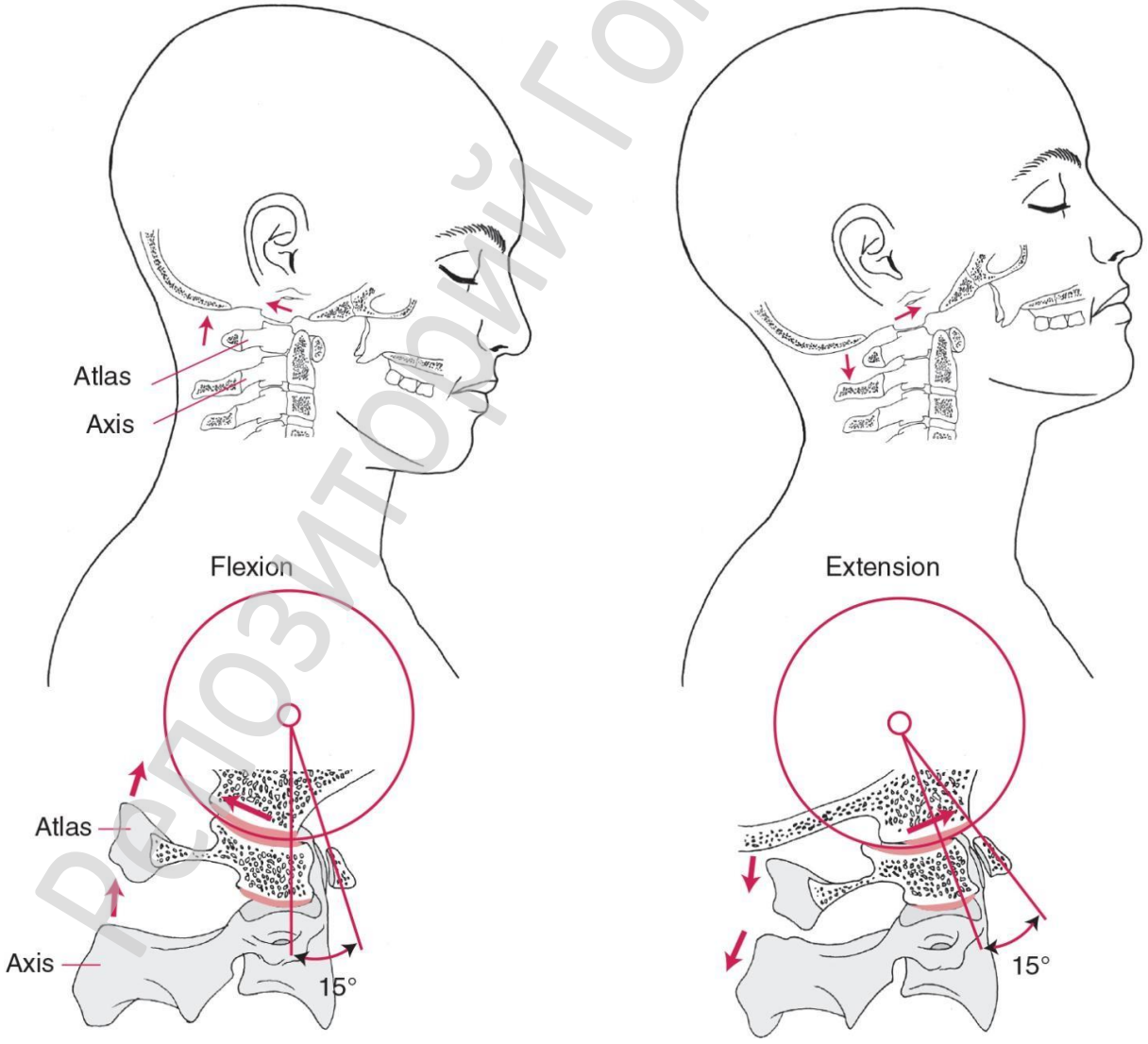
The cruciate ligament of atlas *(lig. cruciforme atlantis)* consists of two parts: ***longitudinal bands*** *(fasciculi longitudinales)* pass from posterior surface of the body of axis to anterior border of the foramen magnum and ***transverse ligament of atlas*** *(lig. transversum atlantis)* passes between the inner surfaces of the lateral masses of the atlas.

Should the transverse ligament of the atlas fail due to trauma or disease, the dens is no longer anchored and can travel up the cervical spine, causing paralysis. If it reaches the medulla death can result.

The tectorial membrane *(membrane tectoria)* passes from the clivus and anterior edge of the foramen magnum to the body of the axis. It is continues with posterior longitudinal ligament.



a b

Figure 6.2 — Atlantooccipital joint: a — flesion; b — extension

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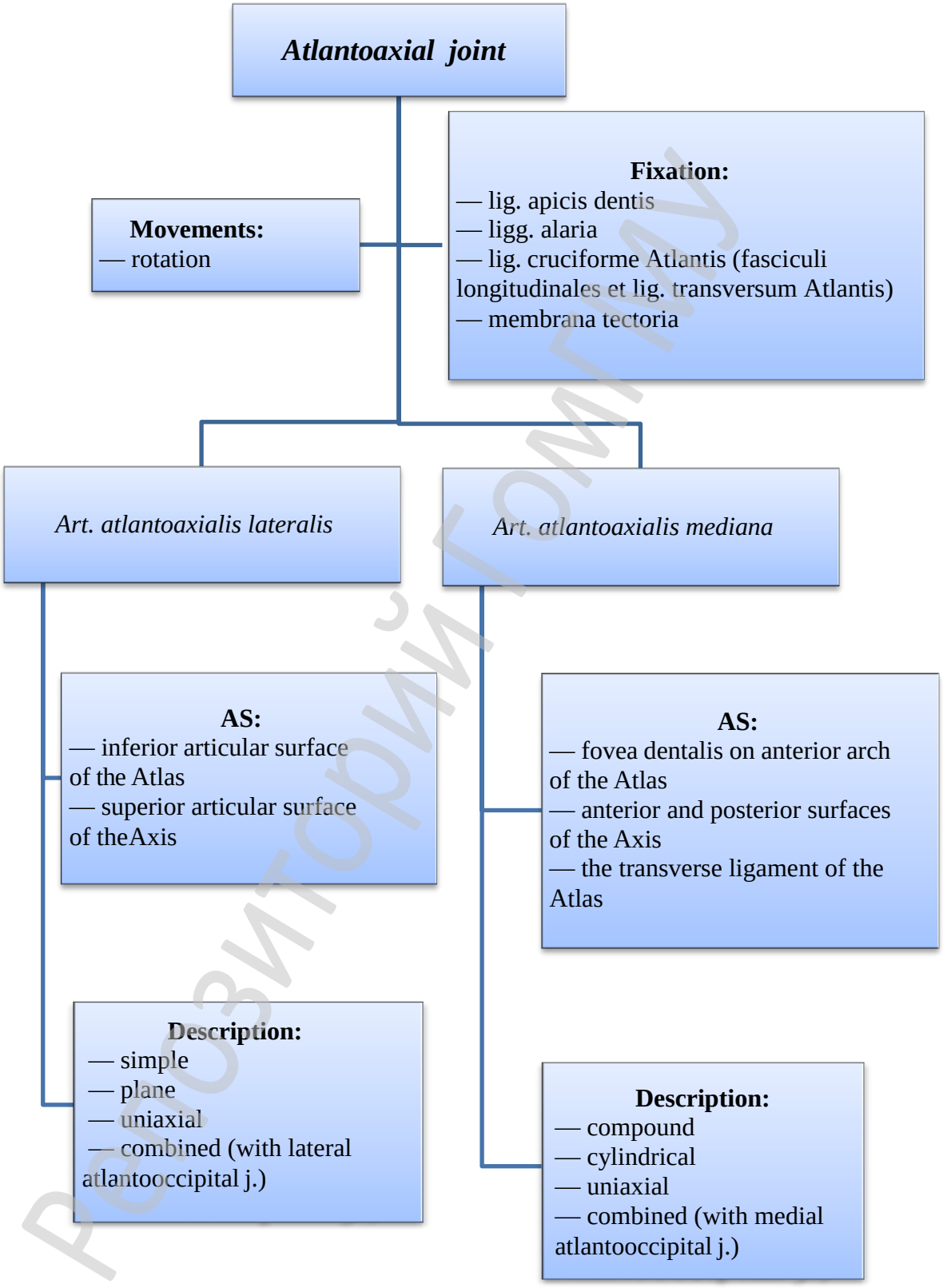

Figure 6.3 — Atlantoaxial joint

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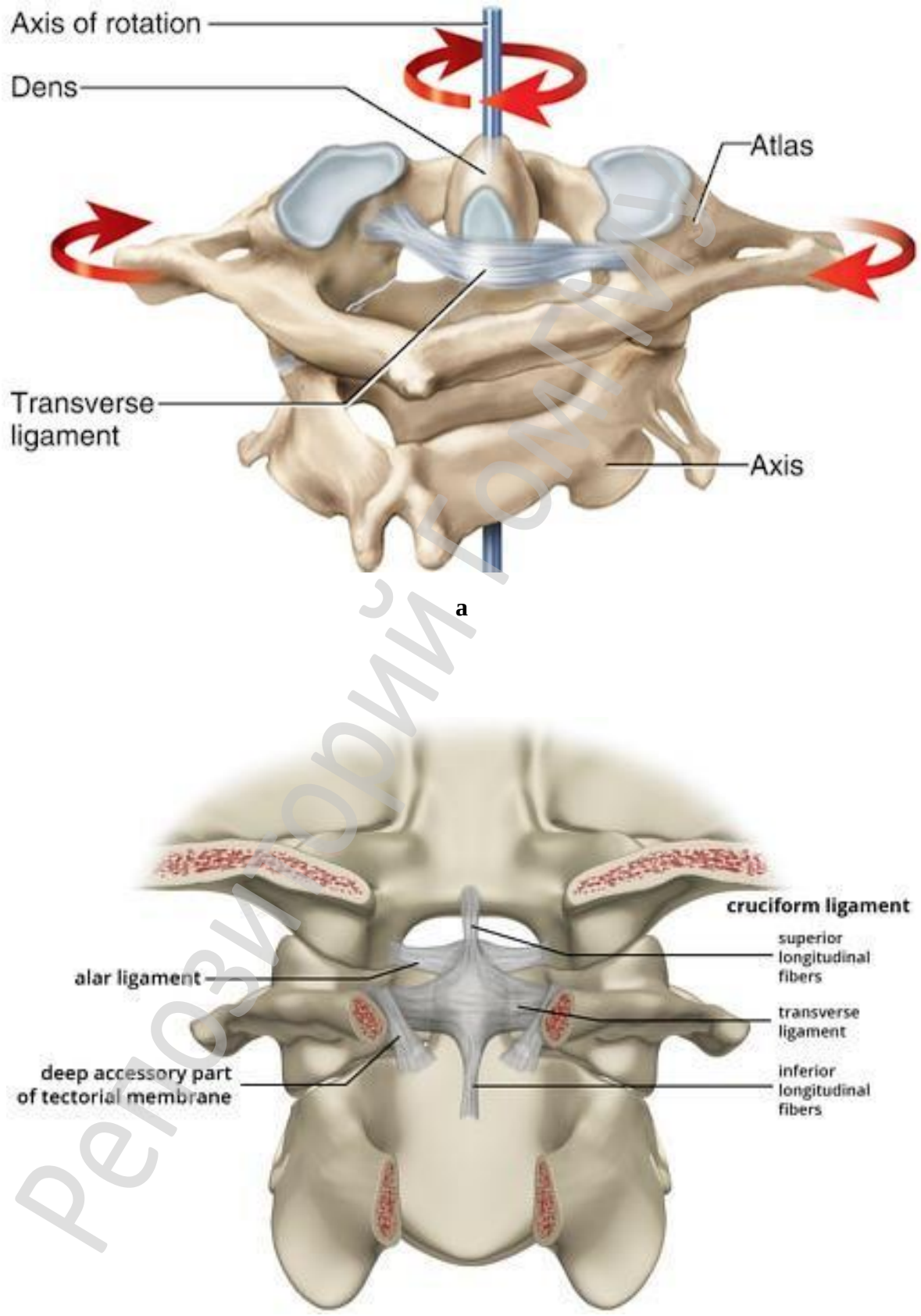

Figure 6.4 — Atlanto-axial joint: a — movements; b — ligaments

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7. ARTICULATIONS OF THE SPINE

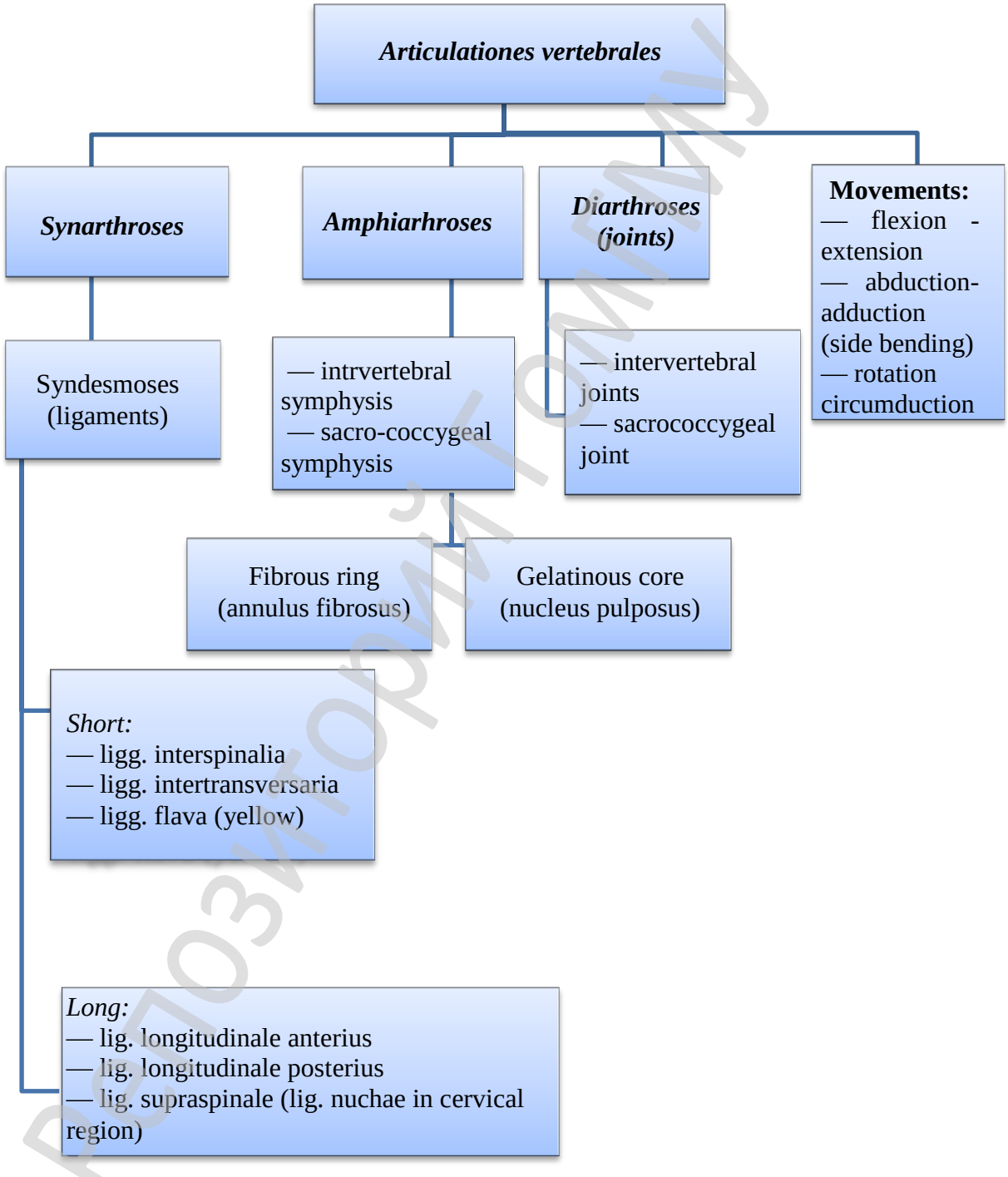

Figure 7.1 — Articulations of the spine

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Syndesmoses of vertebral column

Long ligaments:

The anterior longitudinal ligament *(lig.longitudinale anterius*) stretches on anterior surface of the vertebral bodies and intervertebral discs from the anterior tubercle of the atlas to the upper part of the pelvic surface of the sacrum.

The posterior longitudinal ligament *(lig.longitudinale posterius)* extends on posterior surface of the vertebral bodies in the vertebral canal from the second cervical vertebra to the upper end of the sacral canal.

The supraspinous ligament *(lig. supraspinale)* is stretched over the apices of the spinous processes. The nuchal ligament *(lig. nuchae)* is the supraspinous ligament in the cervical region. It is attached to the spinous processes of cervical vertebrae, external occipital protuberance and external occipital crest.

Short ligaments:

The yellow ligaments *(ligg. flava)* are filled in the spaces between the arches. They are elastic fibres of yellow color.

The interspinous ligaments *(ligg. interspinalia)* stretches between the spinous processes.

The intertransverse ligaments *(ligg. intertransversaria)* stretches between the transverse processes.

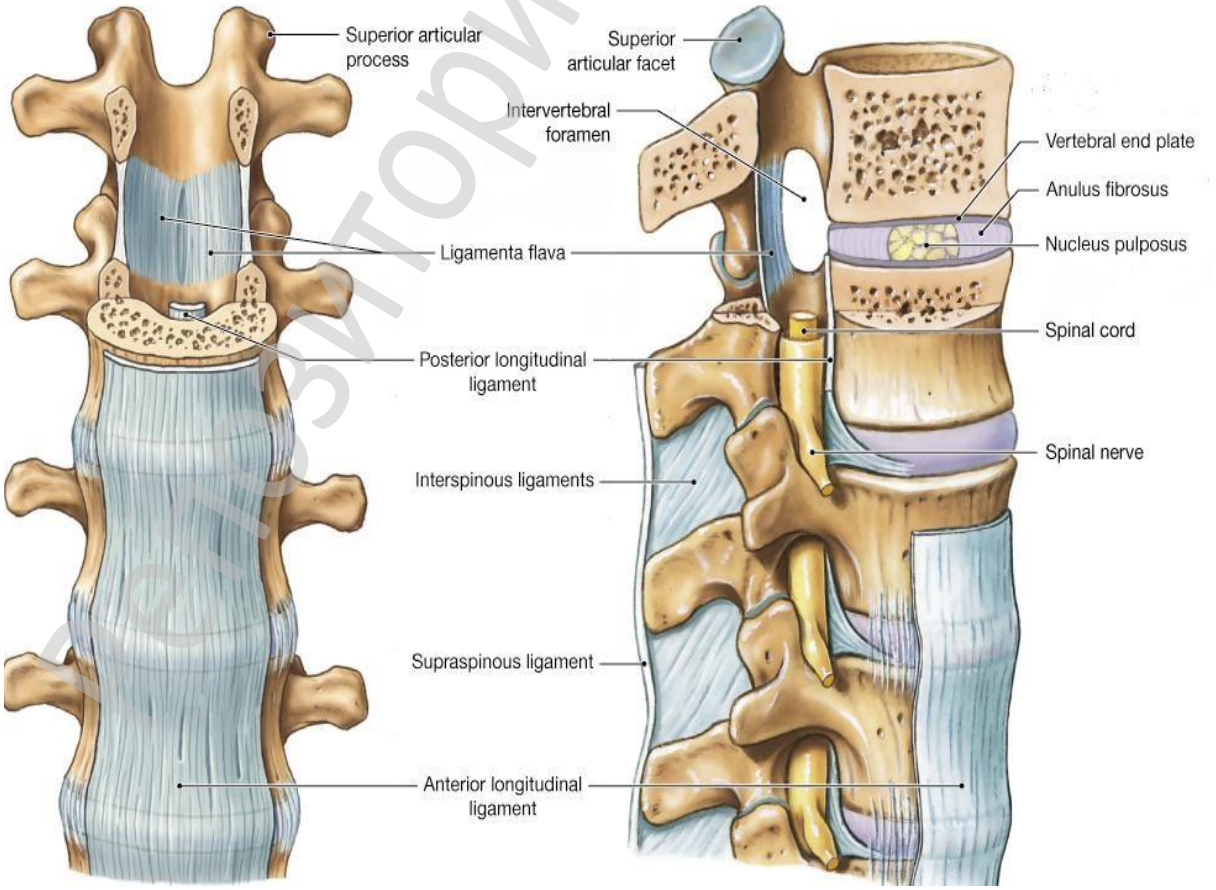

Figure 7.2 — Ligaments of vertebral column

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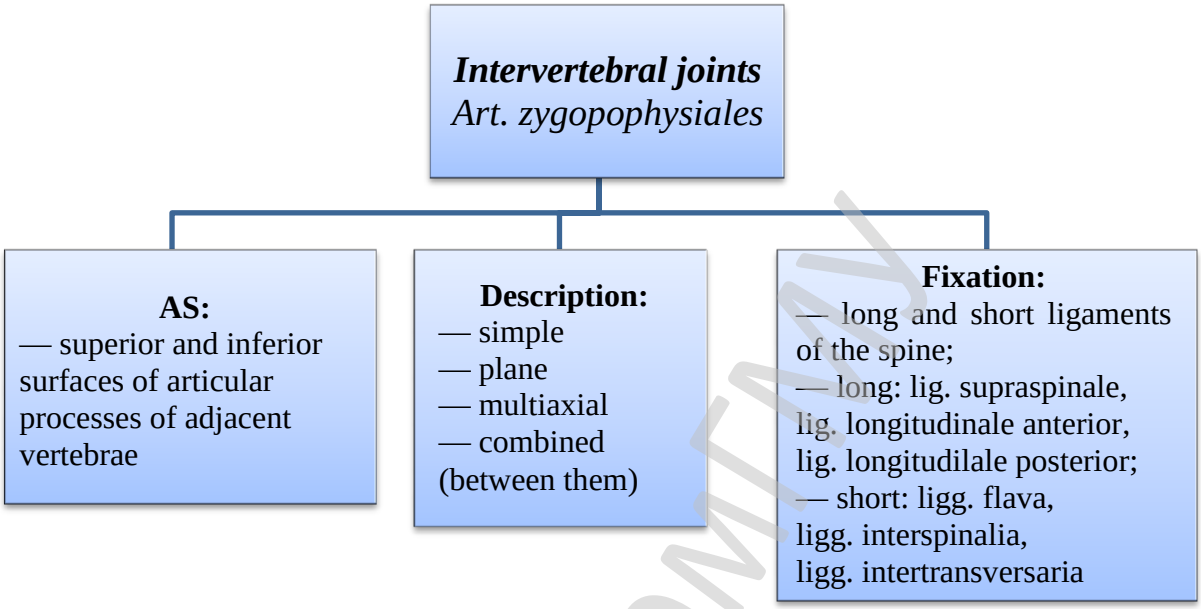

Figure 7.3 — Intervertebral joints

Between the bodies of neighboring vertebra an ***intervertebral disc*** is inserted. The disc consists of fibrous tissue ring *(annulus fibrosus)* and pulpous core *(nucleus pulposus)* in the middle of the ring. It makes the movements softer and performs function of amortization. With the time pass the disc becomes thinner. In heavy loads on spine an intervertebral hernia may occur and cause compression of spinal cord.

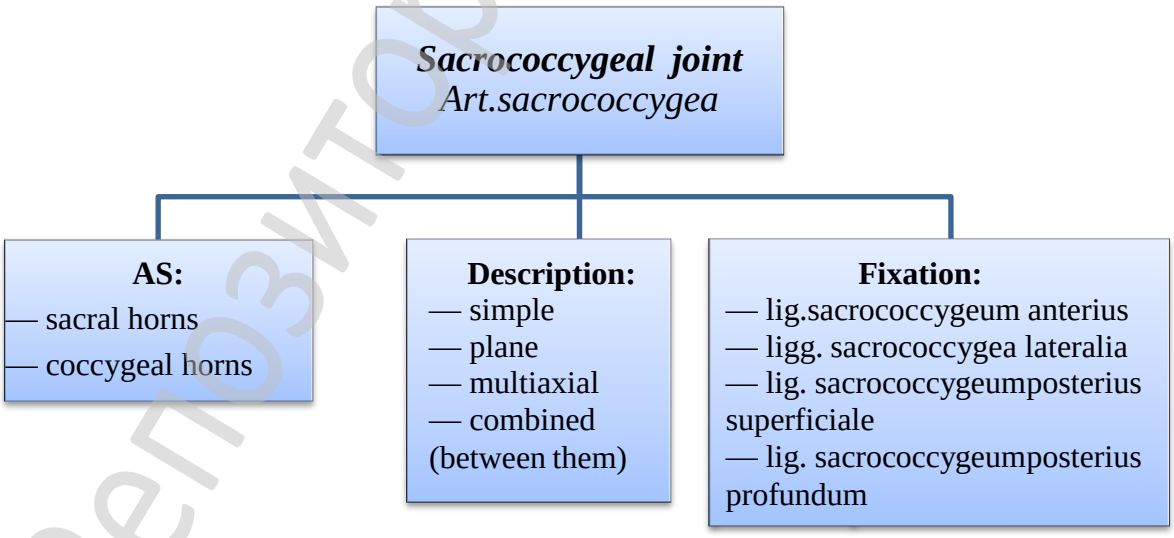

Figure 7.4 — Sacrococcygeal join

A ***disk*** of fibrocartilage is interposed between the contiguous surfaces of the sacral bone and coccyx. It differs from those between the bodies of the vertebrae in that it is thinner, and its central part is firmer in texture. Sometimes the coccyx is movable, most notably during pregnancy and childbirth; the cartilage has small cavity and it allows the coccyx to bend backward.

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The anterior sacrococcygeal ligament *(lig. sacrococcygeum anterius)* consists of a few irregular fibers. It passes from the anterior surface of the sacrum to the front of the coccyx, blending with the periosteum.

The lateral sacrococcygeal ligament *(lig. sacrococcygeum laterale)* exists on either side and passes from the transverse process of the coccyx to the lower lateral angle of the sacrum. It completes the foramen for the fifth sacral nerve.

The posterior sacrococcygeal ligament *(lig. sacrococcygeum posterius)* contains a flat band and passes from the margin of sacral hiatus to posterior surface of the coccyx. This ligament completes the lower and back part of the sacral canal, and is divided into a short deep portion *(pars profunda)* and a longer superficial part *(pars superficialis).*

Movements of the vertebral column

- Around the frontal axis: flexion (forward to 160^0) and extension (backward to 145°).
- Around sagittal axis: abduction and adduction (bending to the right and left, ∑ 165°).
- Around the vertical axis: rotation of the trunk (turning to the right and left, ∑ 120°).
- Circumduction.

The range of movements between two adjacent vertebrae can't be wide. Owing to the great number of segments composing the vertebral column, however, the total sum of small-range movements between the vertebrae lends the whole spine rather considerable mobility.

The cervical and upper lumbar parts are most mobile, while the thoracic part is the least mobile because it is connected to the ribs. The sacrum is absolutely immobile.

Springy movements (elongation and shortening of the spine).

The spine as a whole

The spine forms a flexible and elastic vertical column by means of the vertebrae, intervertebral cartilages *(intervertebral discs)* and ligaments. The discs prevent the vertebrae from coming close to one another, while the ligaments prevent them from drawing far apart.

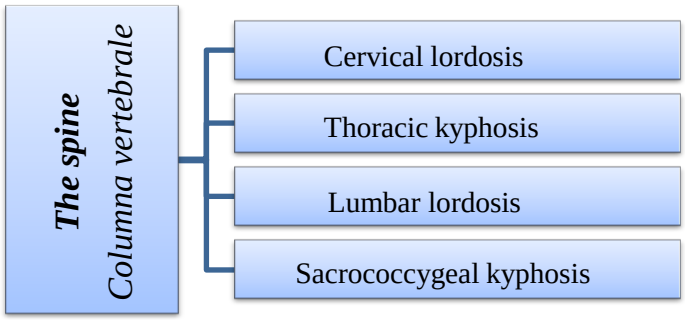

Figure 7.5 — Curvatures of the spine

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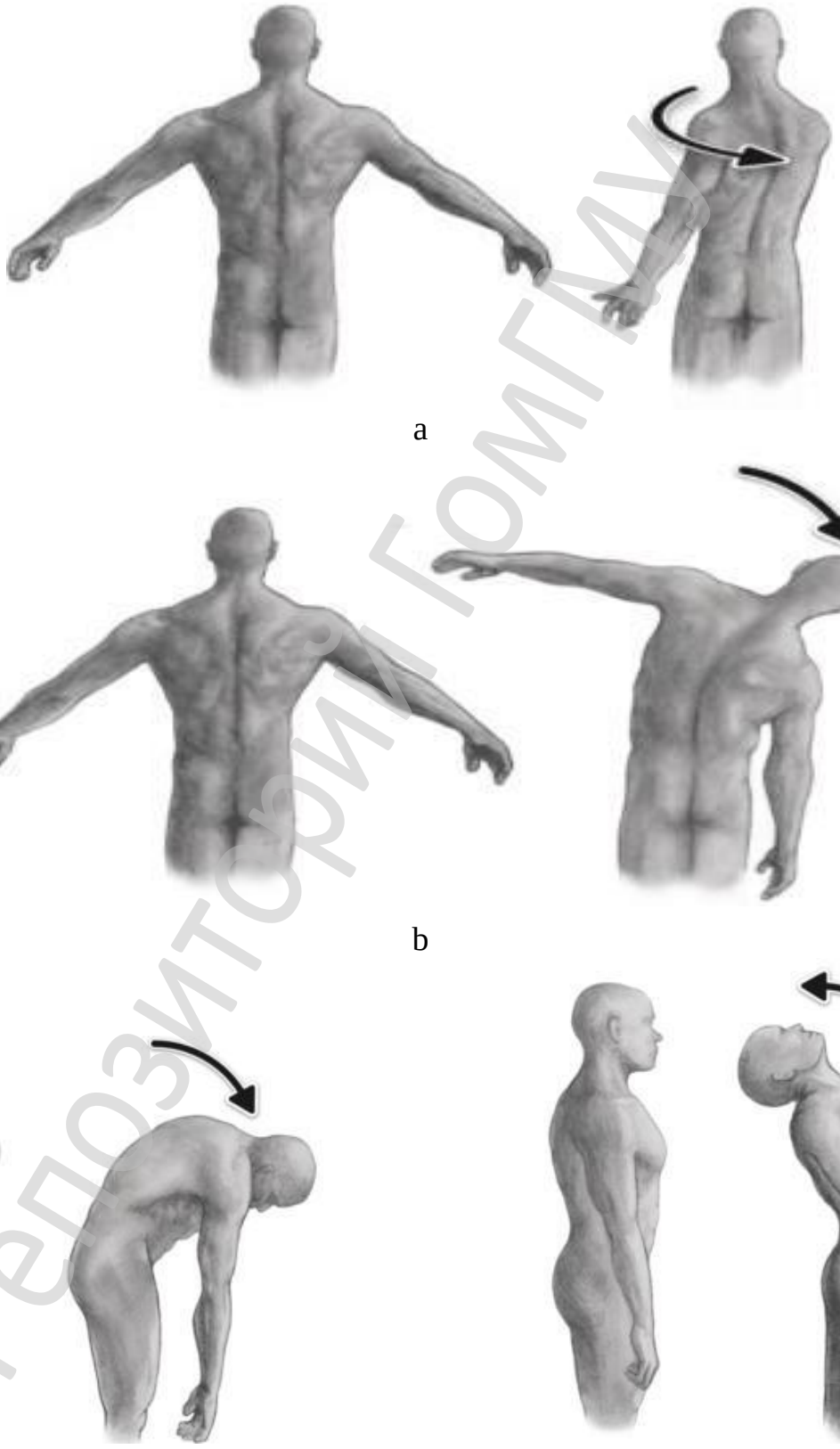

Figure 7.6 — Movements of vertebral column:
a — rotation; b — lateral flexion; c — flex- ion-extension

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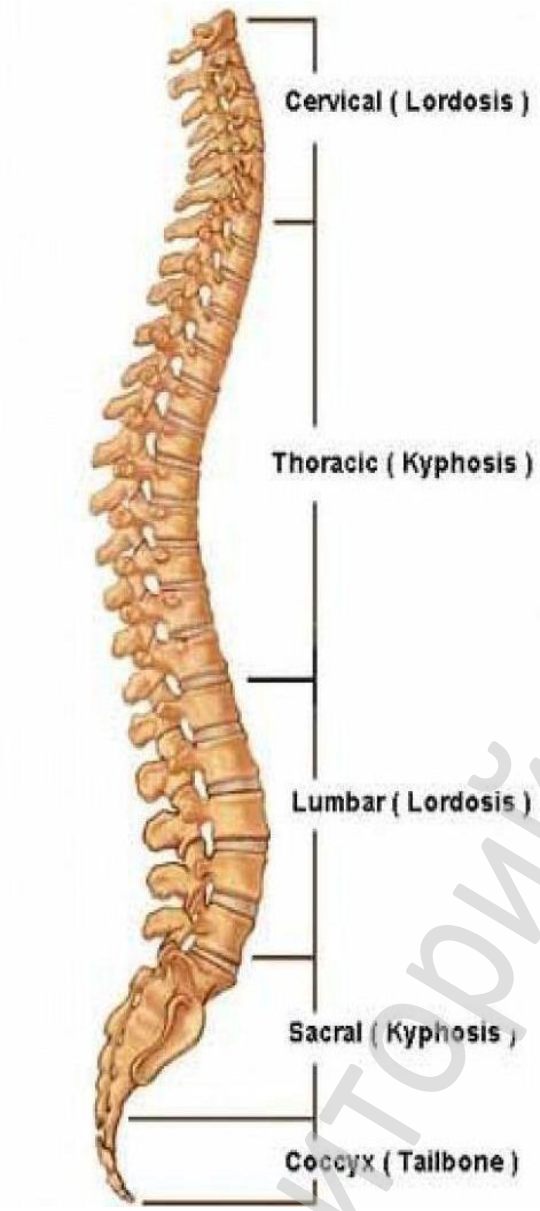

Figure 7.7 — Curvatures of the spine

The spine is a vertical column of vertebrae and it is curved in the sagittal plane. The curvatures in the thoracic and sacral parts are posteriorly convex and are called ***kyphosis***, while the cervical and lumbar segments are anteriorly convex and are called ***lordosis***.

The spine of a newborn is almost straight and the curvatures are hardly formed. When an infant starts to raise its head, a cervical curvature forms. To hold the head raised, the spine curves forward and as a result the *cervical lordosis* forms. Then, when a sitting posture is adopted, the *thoracic kyphosis* increases, and later, when the child learns to stand and walk, the main curvature, the *lumbar lordosis*, forms. With the formation of the lumbar lordosis the pelvis tilts; to remain in the vertical position, the spine curves in the lumbar region and the center of gravity is displaced to the back of the hip joint axis and causes the development of sacrococcygeal kyphosis. This prevents the trunk from falling forward and associated with the maintenance of balance in a vertical body posture.

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8. ARTICULATIONS OF THE THORACIC CAGE

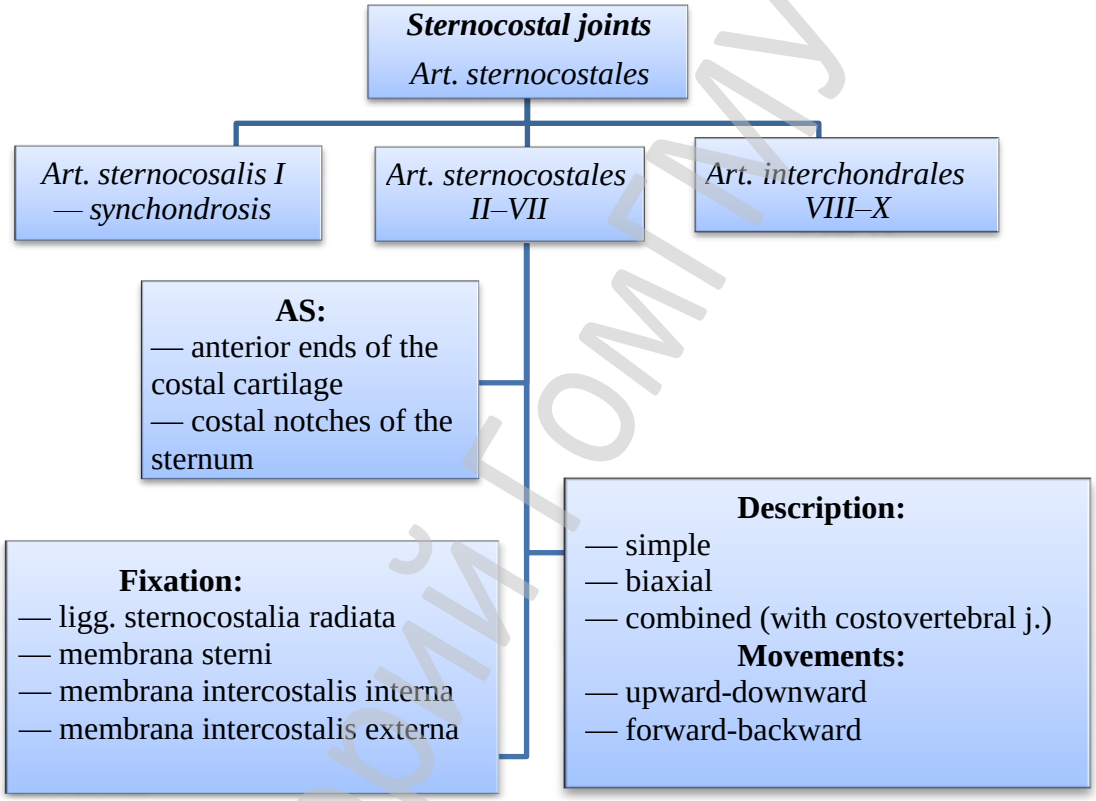

Figure 8.1 — Sternocostal joints

The radiate sternocostal ligaments *(ligg. sternocostalia radiata)* consist of broad and thin membranous bands that radiate from the front and back of the sternal ends of the cartilages of the true ribs to the anterior and posterior surfaces of the sternum.

The sternal membrane *(membrane sterni)* is formed by the fibers or the radiate sternocostal ligaments and covers the anterior surface of the sternum.

The external intercostal membrane *(membrane intercostalis externa)* is the sternal (anterior) continuation of the external intercostal muscles in the intercostal space. It ends on the sternum.

The internal intercostal membrane *(membrane intercostalis interna)* is the continuation of the internal intercostal muscles at the vertebral end of the intercostal spaces.

There is no synovial membrane between the first costal cartilage and the sternum, as this cartilage is directly continuous with the manubrium. In old age, the cartilages of most of the ribs become continuous with the sternum, and the joint cavities are consequently obliterated.

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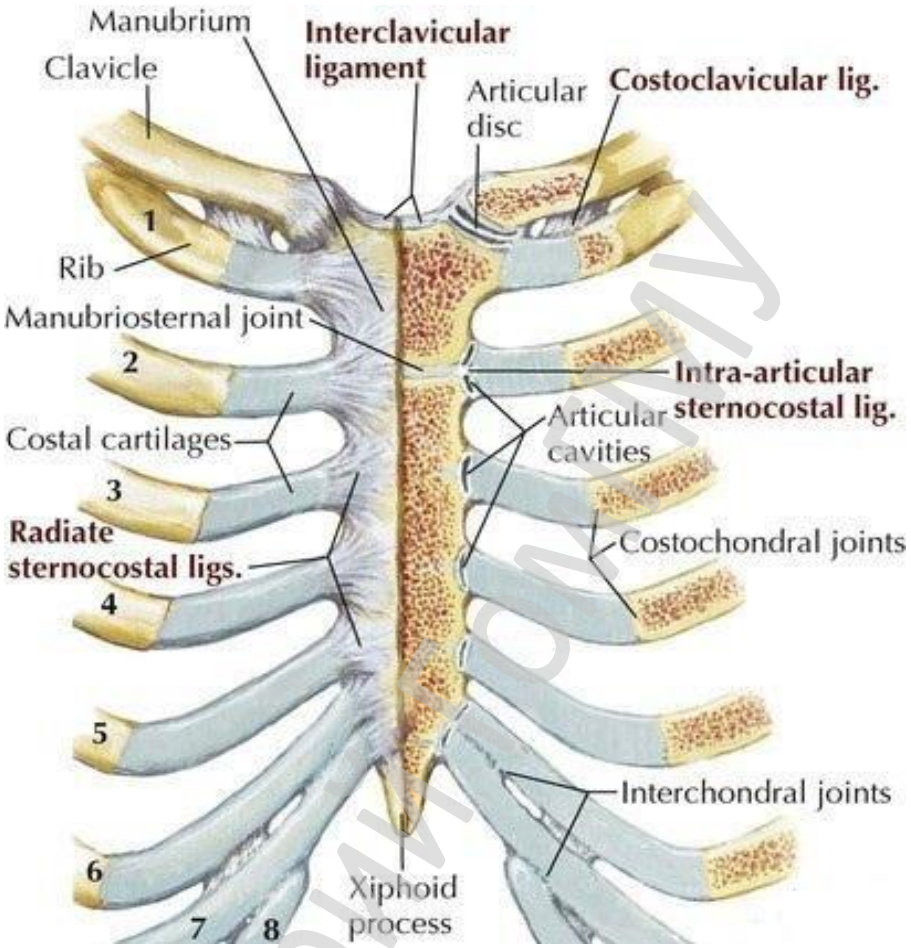
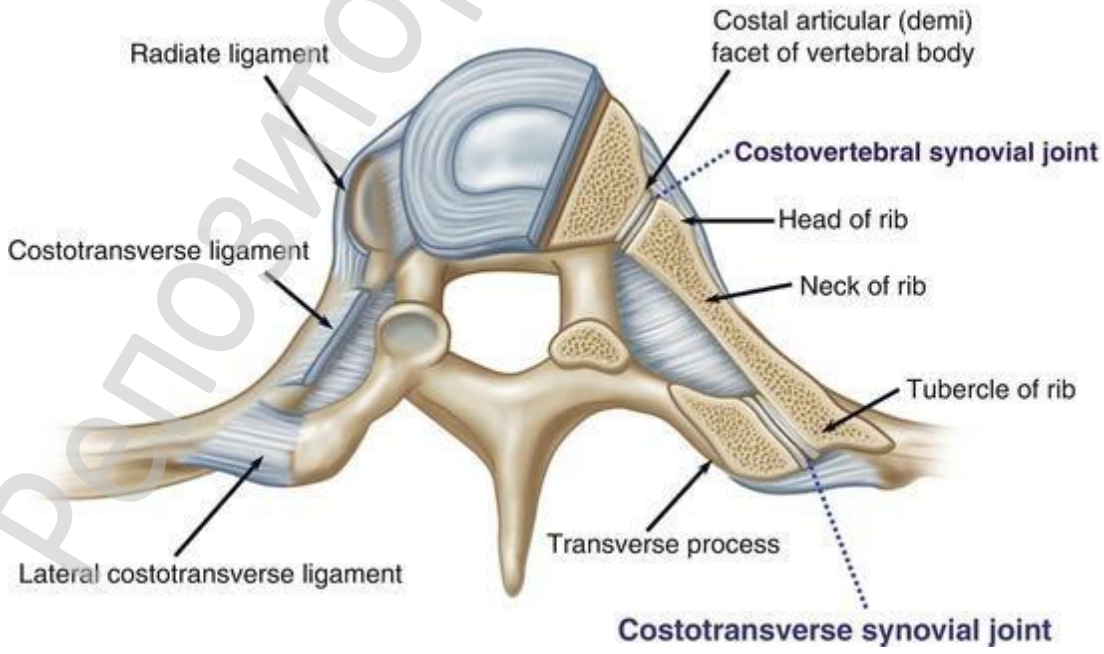


a



b

Figure 8.2 — Joints of rib cage: a — sternocostal joints; b — costovertebral joints

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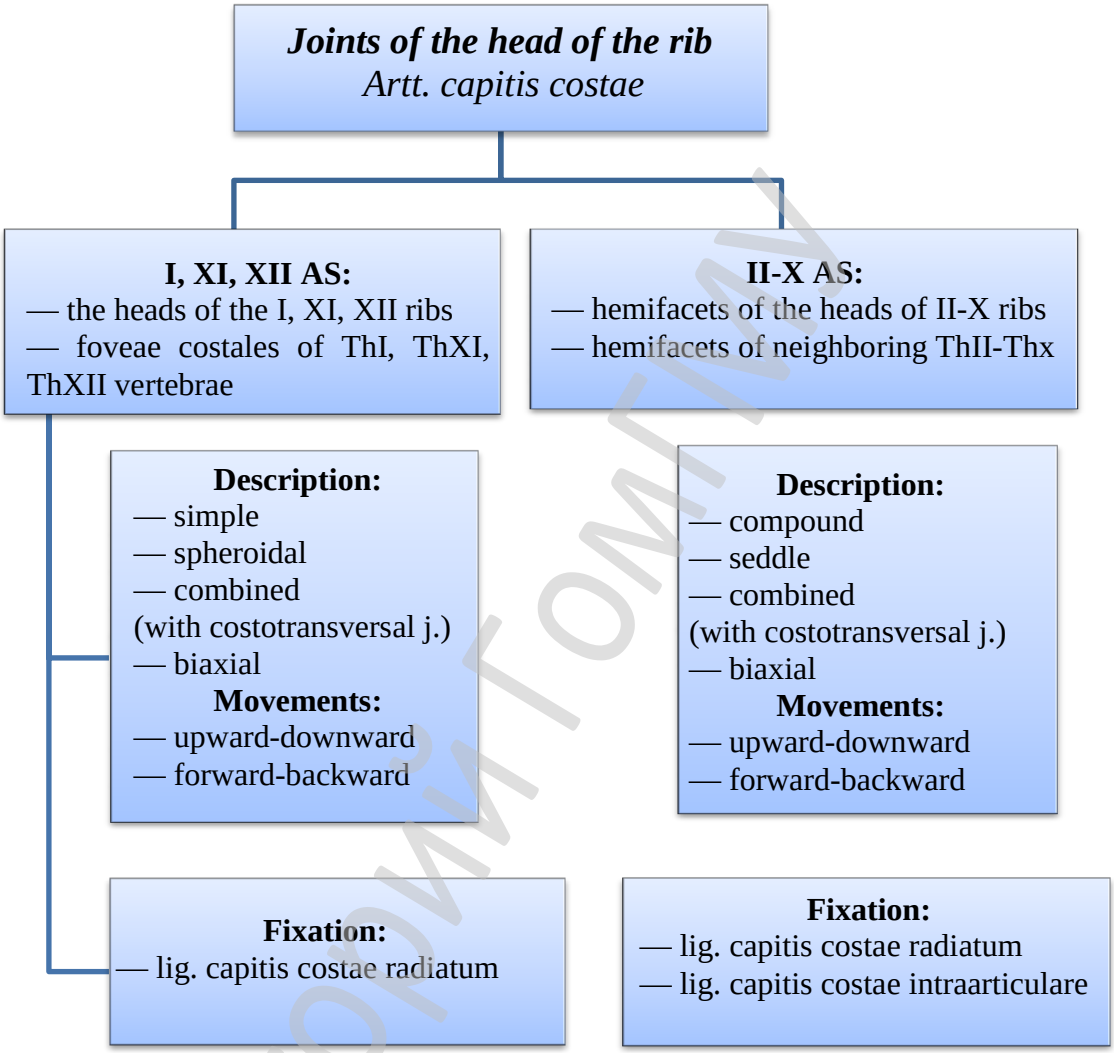

Figure 8.3 — Joints of the heads of the ribs

The radiate ligament of head of rib *(lig. capitis costae radiatum)* passes from the head of the rib to the bodies of vertebrae and intervertebral disc.

The intraarticular ligament of head of rib *(lig. capitis costae intraarticulare)* passes from the crest of the costal head to the intervertebral disc. The joints of the II–X ribs only have the ligaments, because the heads of these ribs articulate each with the costal facets of two adjacent vertebrae.

The lateral costotransverse ligament *(lig. costotransversarium laterale)* is short and strong and passes the apex of the transverse process to the adjacent costal tubercle.

The superior costotransverse ligament *(lig. costotransversarium superius)* passes between the crest of the neck of the rib and lower part of the transverse process above.

The lumbocostal ligament (*lig. lumbocostale*) passes from the 12-th rib to the tips of the transverse processes of the first and second lumbar vertebrae.

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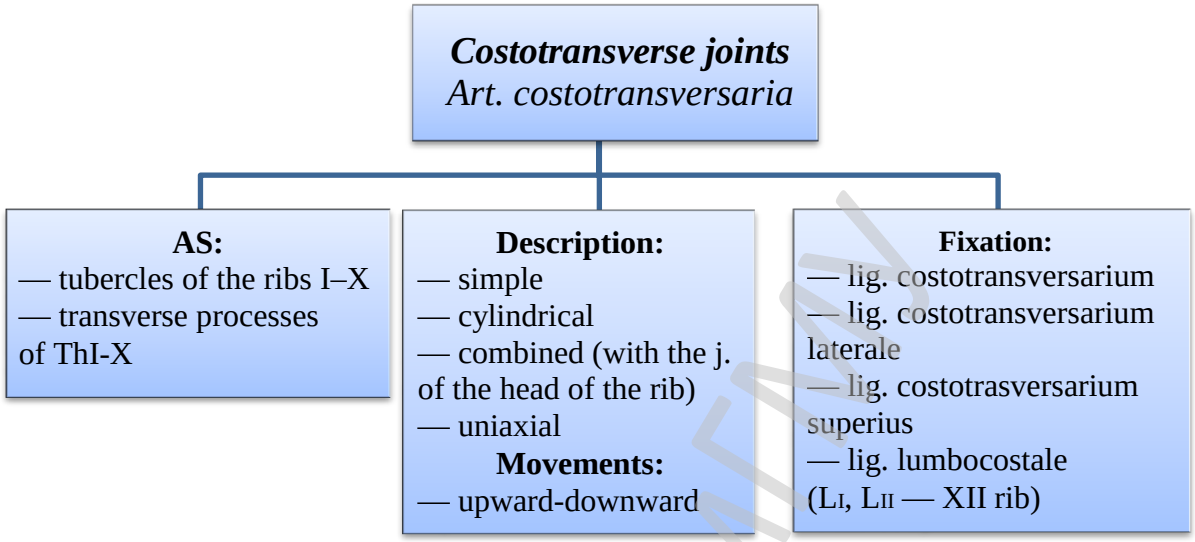

Figure 8.4 — Costotransverse joints

Thoracic cage as a whole

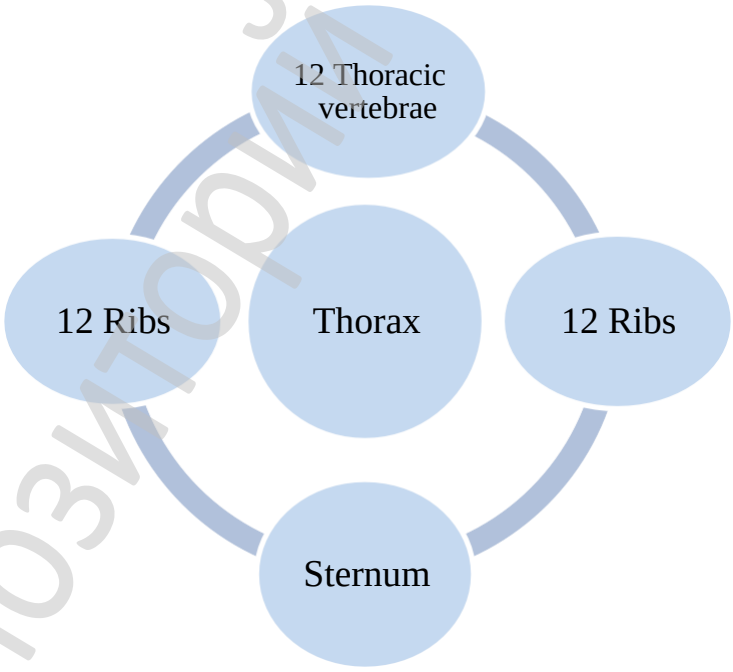

Figure 8.5 — Formation of thoracic cage

The thoracic cage *(compages thoracica)* is a bonny ring formed by connected 12 thoracic vertebrae from behind, 12 pairs of ribs on both sides and sternum anteriorly.

The thoracic cavity (cavum thoracis) has two apertures:

— the superior aperture (inlet) (aperture thoracis superior) is bounded by the 1st thoracic vertebra (atlantis), 1st rib and manubrium of the breast-bone;

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— the inferior aperture (outlet) (aperture thoracis inferior) is bounded by the 12th thoracic vertebrae from behind, costal arch on the sides and anteriorly and xiphoid process in the midline anteriorly.

The anterior border of the thoracic outlet has a shape of an angle and is called infrasternal angle (angulus infrasternalis).

The spaces between neighboring ribs are called intercostal spaces (spatia intercostalia) filled with intercostal muscles.

The thorax is narrow on its upper end and wider on lower end; it is somewhat compressed from front to back; the anterior wall is shorter than the posterior.

The shape and size of the thorax are marked by individual variation according of the development of the muscles and lungs. Three chest shapes are usually distinguished: flat chest, conic chest, and barrel chest.

The ***flat chest*** is narrow and long, and the infrasternal angle is acute, it is found in individuals with weak development of the muscles and lungs.

The ***conic chest*** is wide but short, and infrasternal angle is large, it is found in individuals with well-developed muscles and lungs.

The ***barrel chest*** has an intermediate position between two forms earlier described.

Respiratory movements include raising and lowering the ribs together with sternum. During inspiration the posterior ends of ribs rotate, and the anterior ends rise at the same time thus moving away from the spine together with sternum so that the thorax expands. During expiration ribs are lowered and the chest returns its shape.

The costal cartilages, being flexible and elastic, play an important role in the respiratory excursions.

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9. ARTICULATIONS OF PECTORAL GIRDLE

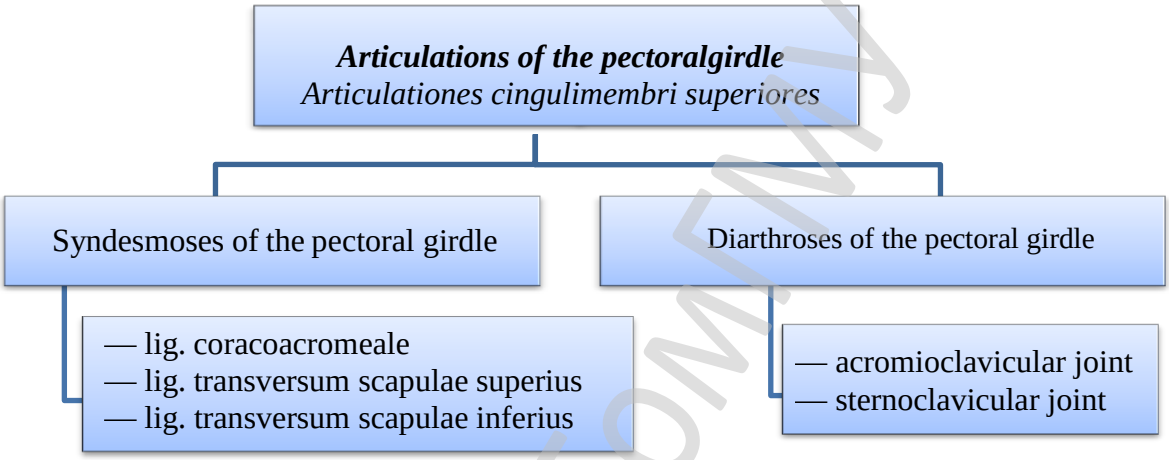

Figure 9.1 — Articulations of the pectoral girdle

The syndesmoses of the pectoral girdle (syndesmoses cinguli pectoralis)

The coracoacromial ligament *(lig. coracoacromeale)* is a ligament between the coracoid and acromial processes. The coracoacromial arch includes the coracoacromial ligament, the acromion and the coracoids process. It forms an accessory socket for the head of humerus, which protects the joint.

The superior transverse scapular ligament *(lig. transversum scapulae superius)* is a ligament above the scapular notch.

It connects the borders of the notch and forms an opening. The suprascapular nerve and artery passes through it.

The inferior transverse scapular ligament *(lig. transversum scapulae inferius)* streches from the base of acromion to the posterior border of the glenoid cavity. It is the weakest ligament.

The acromioclavicular ligament *(lig. acromioclaviculare)* passes from the acromial end of the clavicle to acromion of the scapula.

The coracoclavicular ligament *(lig. coracoclaviculare*) consists of two parts: trapezoid ligament and conoid ligament.

The trapezoid ligament *(lig. trapezoideum)* passes from trapezoid line to coracoids process of the scapulaand occupies the lateral position.

The conoid ligament *(lig. conoideum*) passes from the conoid tubercle to the acromial end of the clavicle and occupies the medial position.

Between the ligaments there is a space in which the fatty tissue is located. This fat performsprotective function for the vessels thatpassthrough it to supply the surrounding tissue.

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The acromioclavicular and sternoclavicular joints are of great importance in flexion and extension of the shoulder joint. They provide the inclination of the scapula, which leads to the rotation of the clavicle (which participates in both joints).

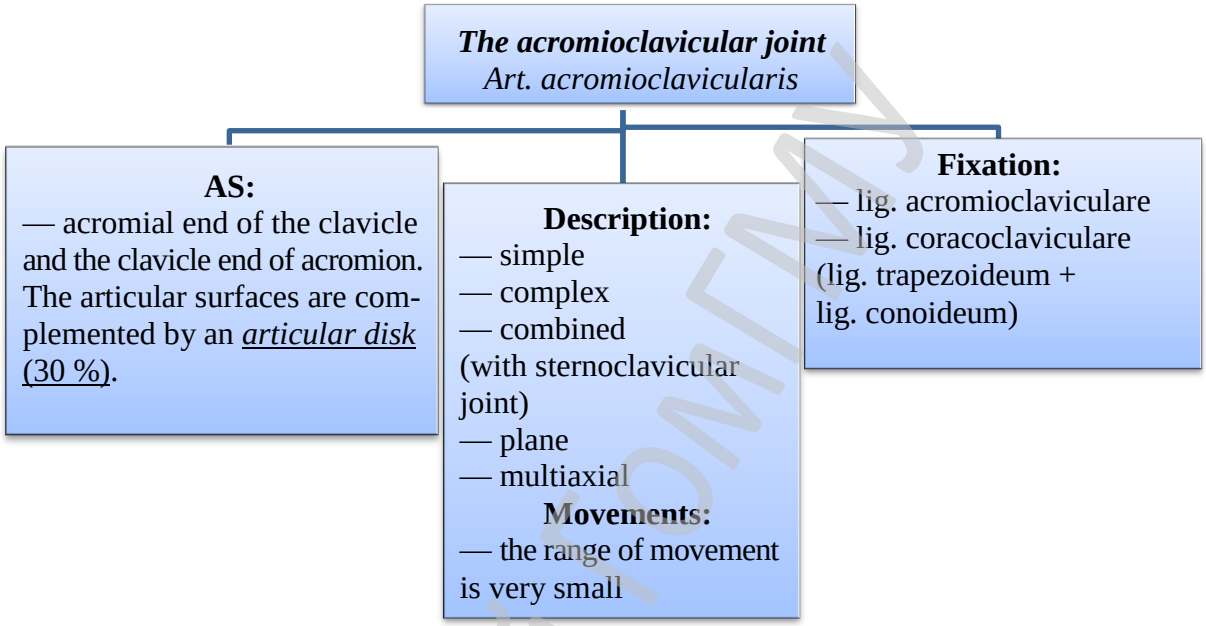

Figure 9.2 — The acromioclavicular joint

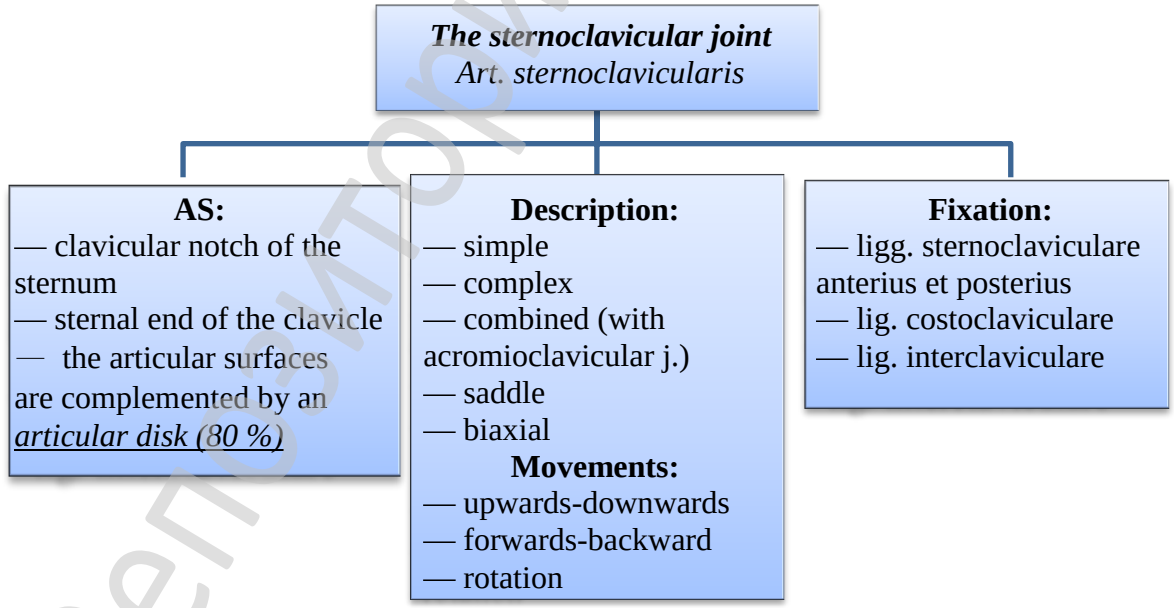

Figure 9.3 — The sternoclavicular joint

The anterior and posterior sternoclavicular ligaments *(ligg. sternoclavicularis anterius et posterius)* strengthen the articular capsule.

The costoclavicular ligament *(lig. costoclaviculare)* passes from the clavicle (impressio lig. costoclavicularis) to the first rib.

The interclavicular ligament *(lig. interclaviculare)* lies between the sternal ends of clavicles.

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10. JOINTS OF FREE UPPER LIMB

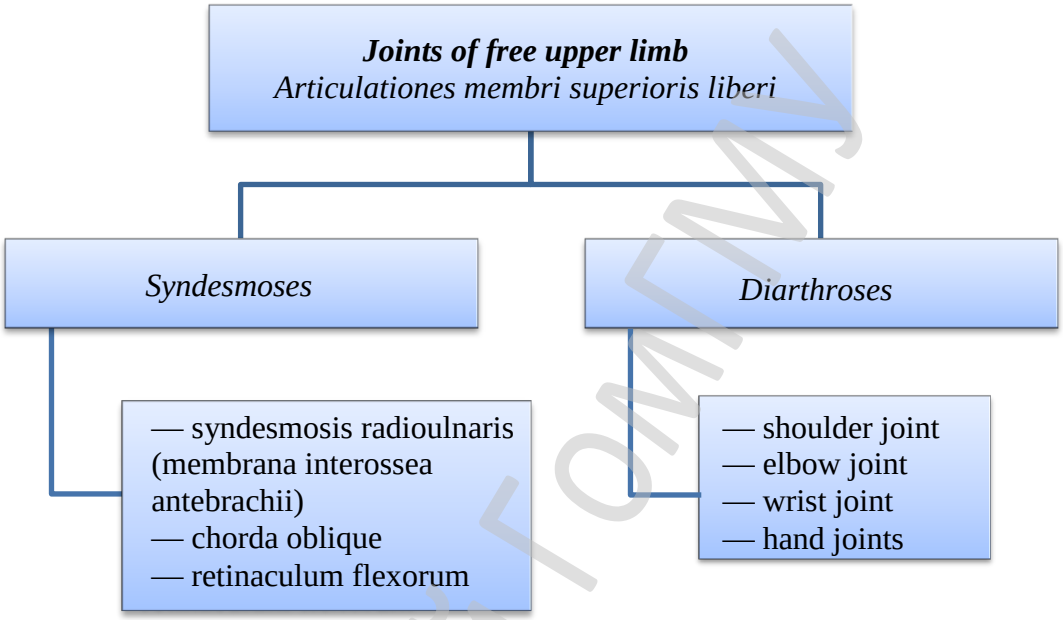

Figure 10.1 — Joints of free upper limb

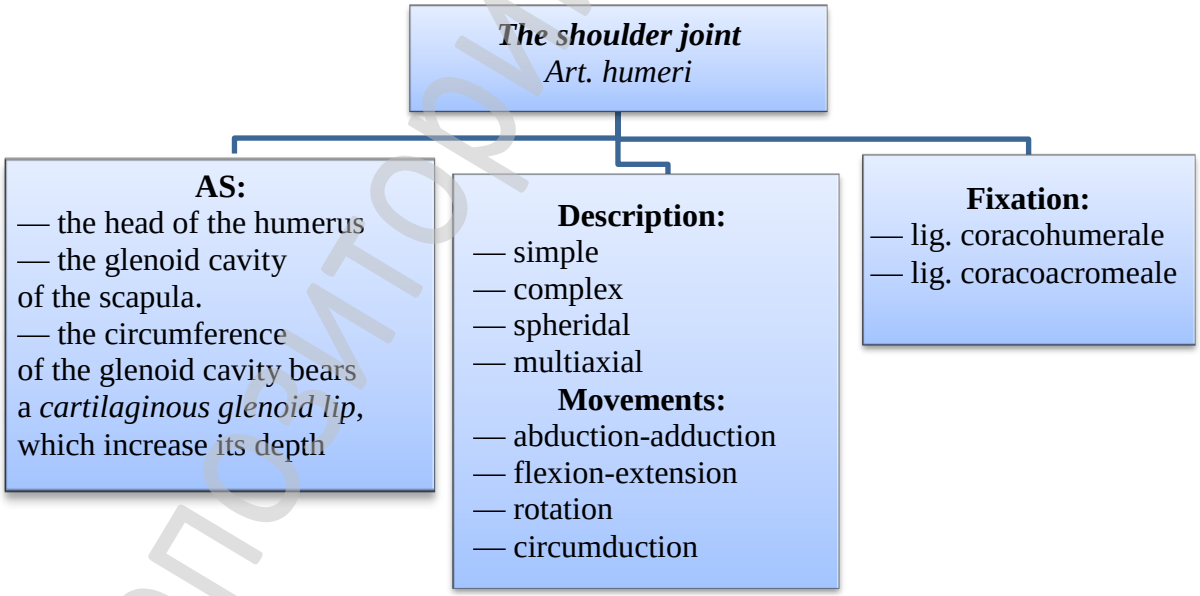

Figure 10.2 — The shoulder joint

The glenoidal labrum *(labrum glenoidale)* — a fibrocartilaginous rim, which surrounds the border of the glenoid cavity, which increases its depth, reducing the risk of dislocation.

The coracohumeral ligament *(lig. coracohumerale)* passes from the root of the coracoids process to the greather tubercle of humerus. It gives strength to the capsule. But it is an accessory ligament, because the shoulder blade has no true ligaments.

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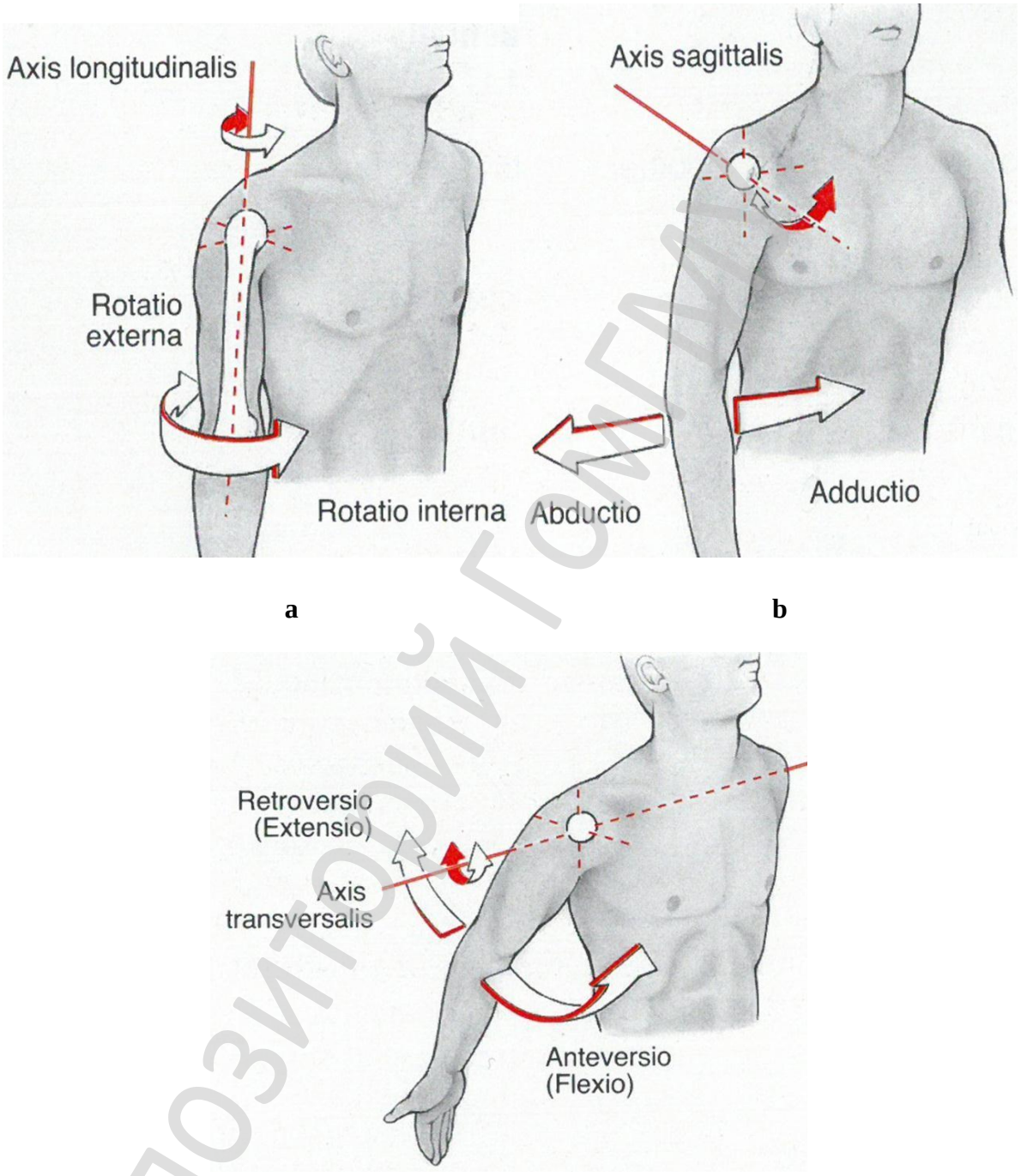

Figure 10.3 — Shoulder joint movements: a — rotation; b — abduction; c — flexion

The coracoacromial ligament *(lig. coracoacromiale)* passes from the acromion and coracoids process of the scapula. It limits the movements around the sagital (abduction) and frontal (flexion) axes.

The glenohumeral ligament *(lig. glenohumerale)* includes superior, middle, inferior bandles, passes with the joint capsule from the glenoid fossa to the anatomical neck of the humerus. They act to stabilize the anterior aspect of the joint.

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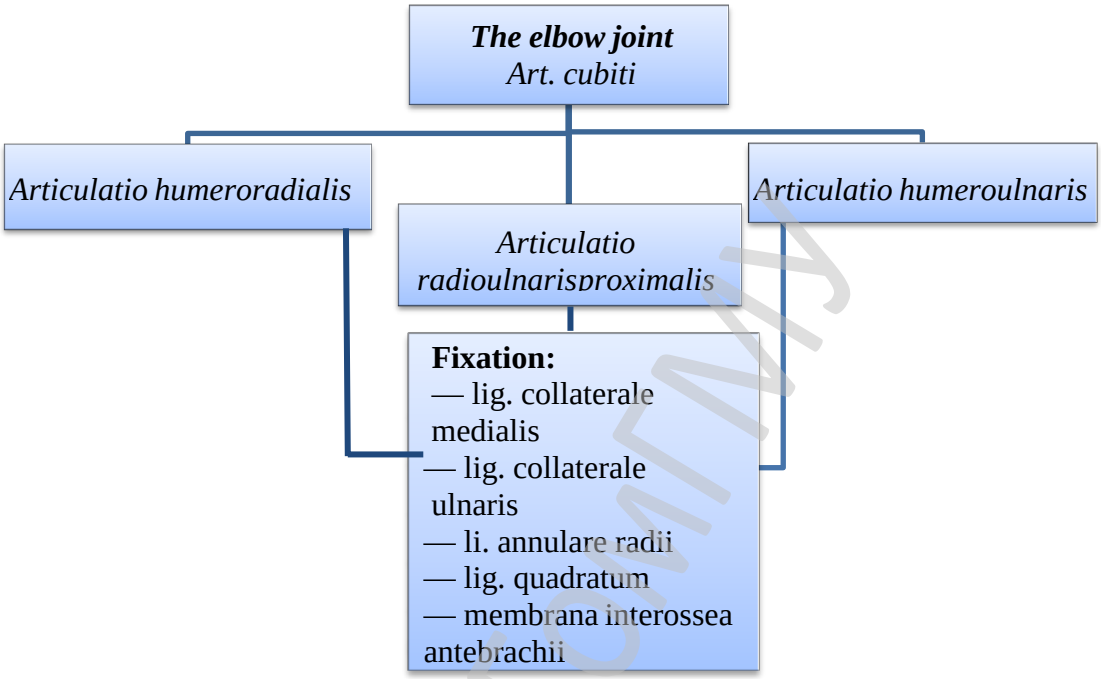

Figure 10.4 — The elbow joint

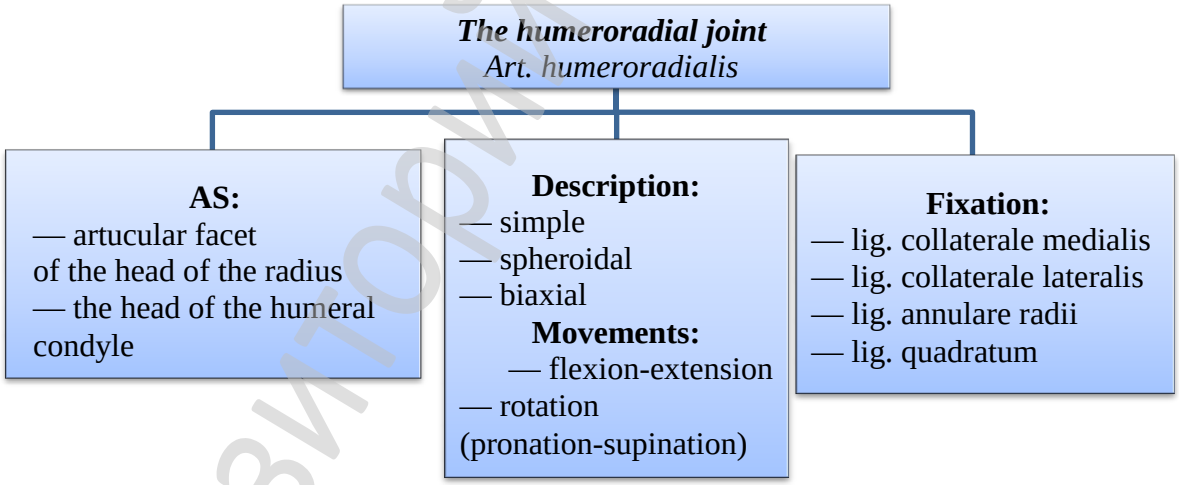

Figure 10.5 — The humeroradial joint

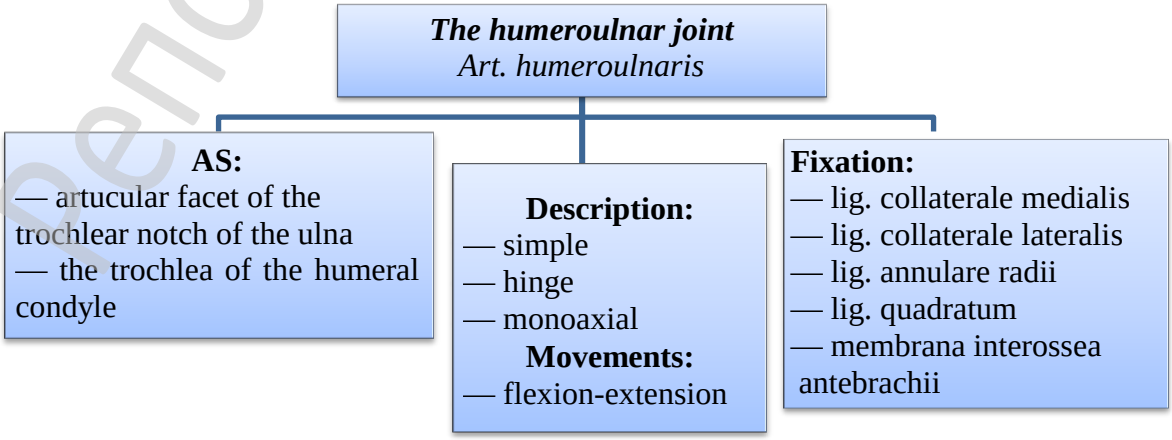

Figure 10.6 — The humeroulnar joint

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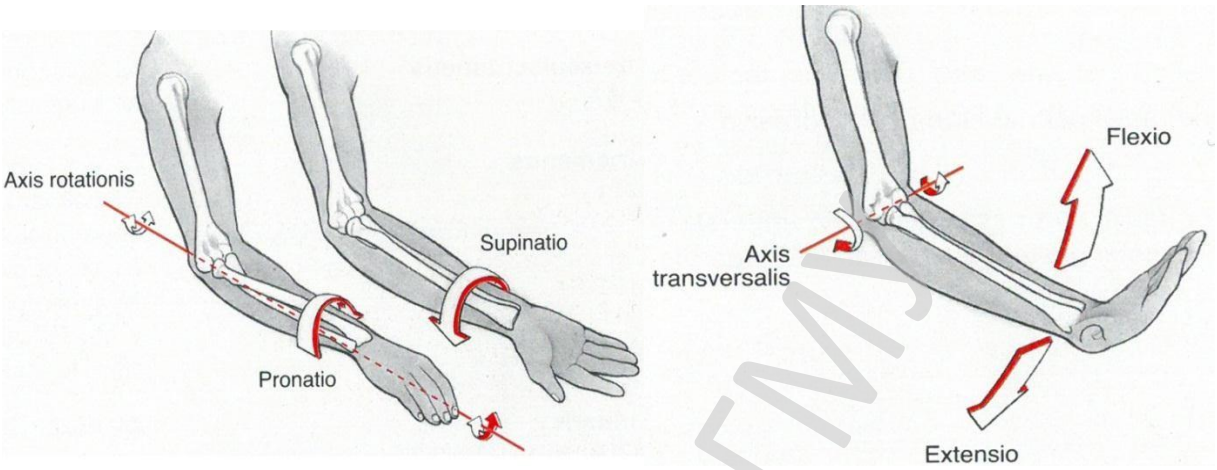

a **b**

Figure 10.7 — Movements of elbow joint: a — rotation; b — flexion

The ulnar collateral ligament *(lig. collaterale ulnare)* passes from medial epicondyle to the trochlear notch of the ulna bone.

The radial collateral ligament *(lig. collaterale radiale)* passes from lateral epicondyle to the head of the radial bone.

The annular ligament *(lig. anulare radii)* passes from radial notch of the ulna bone to the capsule of the elbow joint above. It forms the ring within which the head of the radius rotates.

The quadrate ligament *(lig. quadratum)* is located between the neck of the radius and the radial notch of the ulna and covers the synovial membrane.

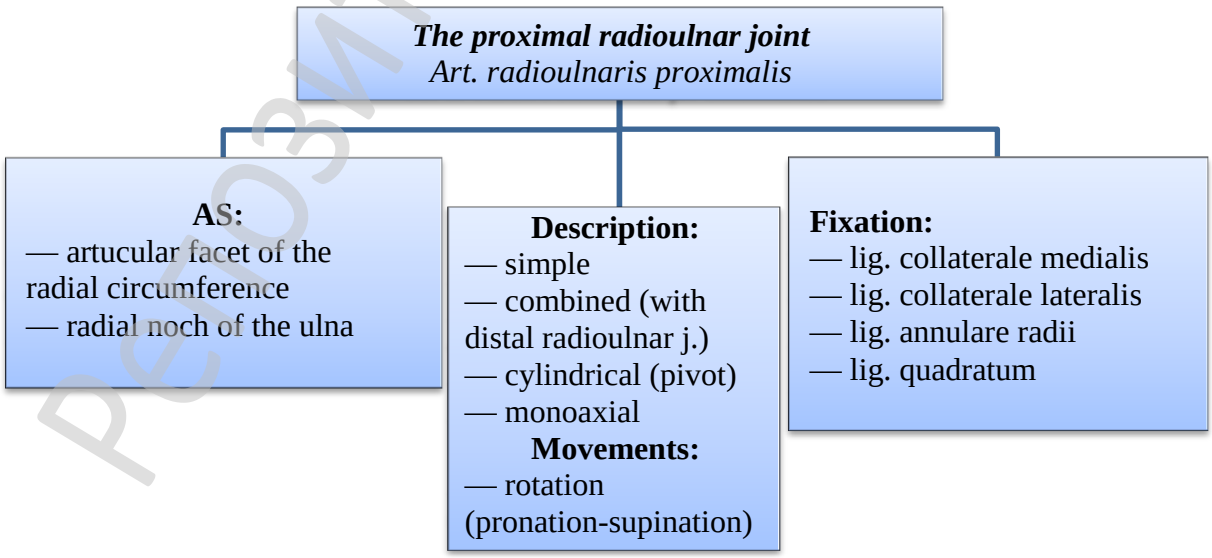

Figure 10.8 — The proximal radioulnar joint

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There are many bursae in the elbow, but only a few have clinical importance: ***Intratendinous*** — located within the tendon of the triceps brachii.

Subtendinous — between the olecranon and the tendon of the triceps brachii, reducing friction between the two structures during extension and flexion of the arm.

Subcutaneous — between the olecranon and the overlying connective tissues.

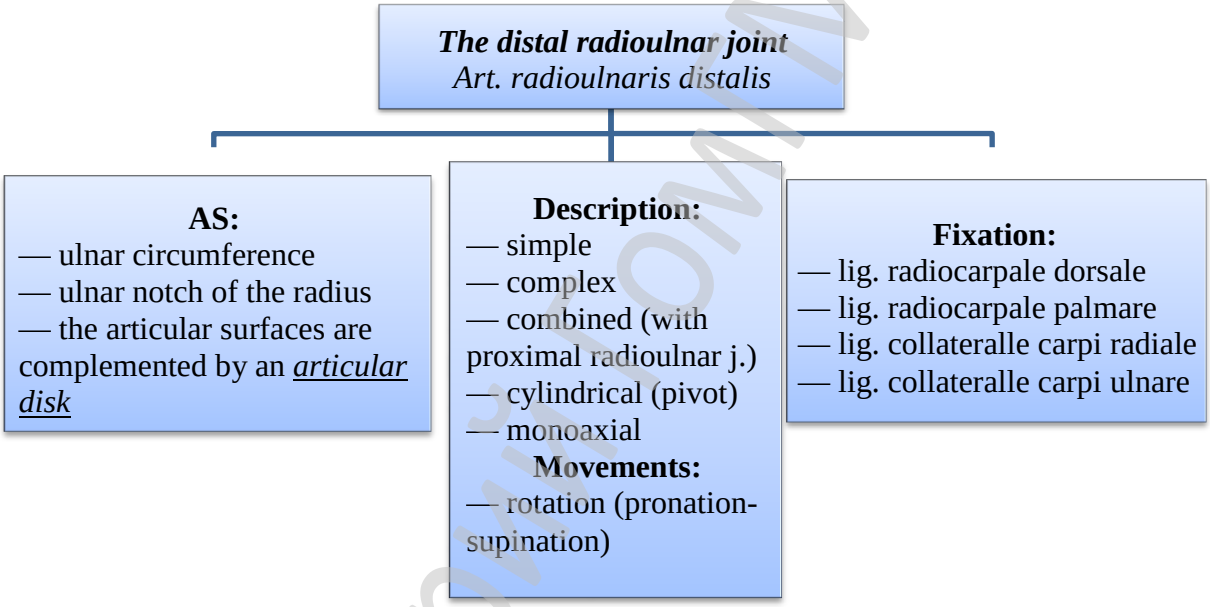

Figure 10.9 — The distal radioulnar joint

The articular disk is a triangular fibrous-cartilaginous plate, which attaches to the ulna notch of the radius. It separates the cavity of the distal radioulanar joint from wrist joint. The disk shows age changes.

The syndesmoses of the forearm (syndesmosisradioulnaris)

The interosseus membrane of forearm *(membrane interossea antebrachii)* connects the interosseal margins of the bodies of the radius and ulna. The fibres of the membrane run downwards and medially from the radius to ulna. It performs.

The oblique cord *(chorda oblique)* consists of fibers which extends from the tuberosity of the radius to the tuberosity of the ulna and have an opposite direction.

A fibrous cartilage disc is present at the distal end of the ulna and lies between the distal ulna and the triquetrum and lunate carpals. The disc is important for proper arthrokinetics of the distal radioulnar joint.

The palmar radiocarpal ligament *(lig. radiocarpal epalmare)* passes from the radius to both rows of carpal bones. Its function, apart from increasing stability, is to ensure that the hand follows the forearm during supination.

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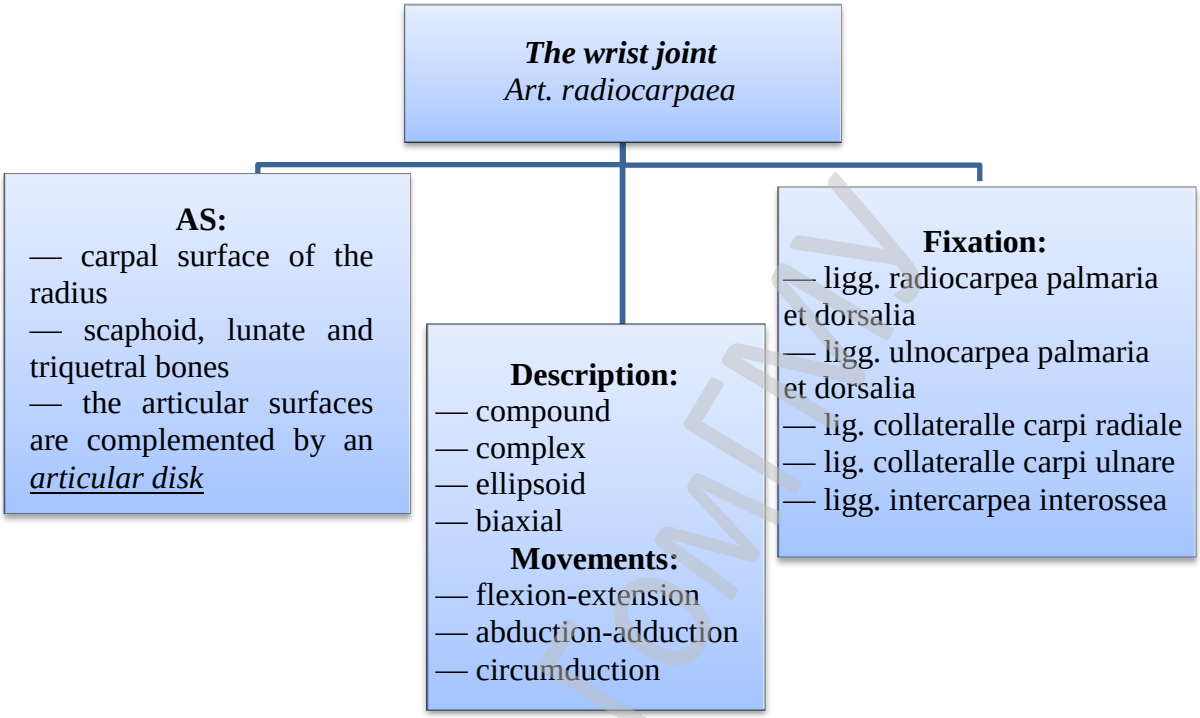

Figure 10.10 — The wrist joint

The dorsal radiocarpal ligament *(lig. radiocarpaledorsal)* is found on the dorsal side of the hand. It passes from the radius to both rows of carpal bones. It contributes to stability of the wrist, and also makes the hand to follow the forearm pronation.

The palmar ulnocarpal ligament *(lig. ulnocarpeum palmare)* passes from the styloid process of the ulna to the lunate and triquetral bones.

The dorsal ulnocarpal ligament *(lig. ulnocarpeum dorsale)* passes from the head of the ulna to the triquetrum. It mixes with the dorsal border of the ulnar collateral carpal ligament.

The ulnar collateral ligament *(lig. collaterale carpi ulnare)* passes from the ulnar styloid process to the triquetrum and pisiform. It works in union with the other collateral ligament to prevent excessive lateral joint displacement.

The radial collateral ligament *(lig. collaterale carpi radiale)* passes from the radial styloid process to the scaphoid. It works in union with the other collateral ligament to prevent excessive lateral joint displacement.

The interosseous intercarpal ligament *(lig. intercarpalia interossea)* is short fibrous band that connect the adjacent surfaces of the carpal bones.

Two ***«heads»*** provide the mediocarpal joint movements and shape***:***

• ***Scaphoid bone*** *(1^{st})* — trapezium, trapezoid and capitate bones form the concave articular surface for it.

• ***Capitate and hamate bones*** *(2^{nd})* — scaphoid, lunate and triquetral bone form the concave articular surface.

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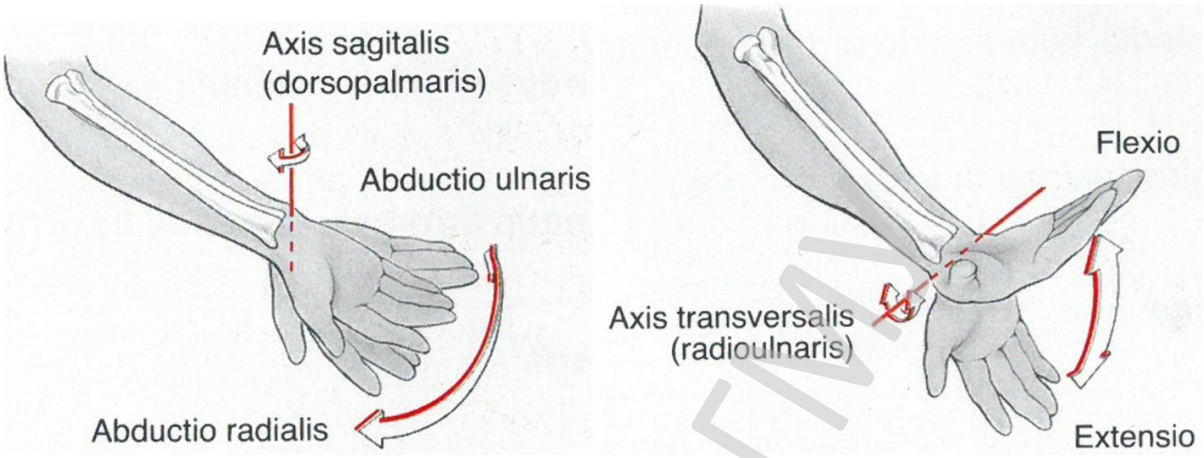

a **b**

Figure 10.11 — Movements of the wrist joint: a — abduction; b — flexion

The mediocarpal joint
Art. mediocarpalis

AS:
— distal ends of the first row of carpal bones
— proximal ends of the second row of carpal bones

Description:
—compound
— spheroid
— monoaxial

Movements:
— movements are restricted

Fixation:
— lig. carpi radiatum
— ligg. intercarpalia dorsalia
— lig. intercarpalia palmaria
— lig. intercarpalia interossea

Figure 10.12 — The mediocarpal joint

The intercarpal joints
Art. intercarpales

AS:
— the neiboring carpal bones

Description:
— simple
— plane
— multiaxial

Movements:
— movements are restricted

Fixation:
— lig. carpi radiatum
— lig. intercarpalia dorsalia
— lig. intercarpalia palmaria
— lig. intercarpalia interossea

Figure 10.13 — The intercarpal joint

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The dorsal intercarpal ligament *(lig. intercarpalia dorsalia)* passes from one carpal bone to another on the dorsal surface.

The palmar intercarpal ligament *(ligg.intercarpalia palmaria)* passes from one carpal bone to another on the palmar surface. Some fibers pass from pisiforme bone and look like beams and form ***the radiate ligament*** *(lig. radiatum).*

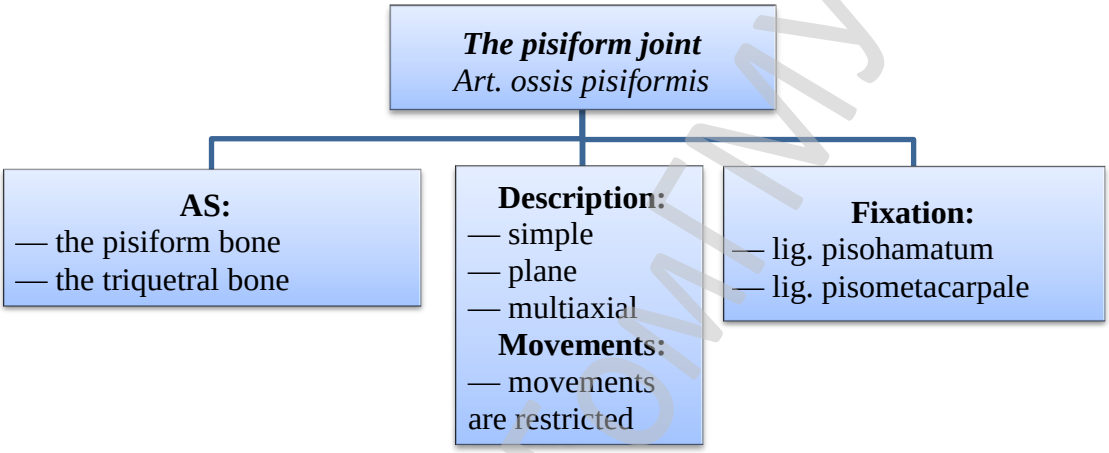

Figure 10.14 — The pisiform joint

The pisohamatum ligament *(lig. pisohamatum)* passes from pisiform bone to hamatum bone.

The pisometacarpal ligament *(lig. pisometacarpale)* stretches from pisiform bone to the base of the 3–5 metacarpal bones.

Carpal tunnel forms when flexor retinaculum bridges over the carpal groove.

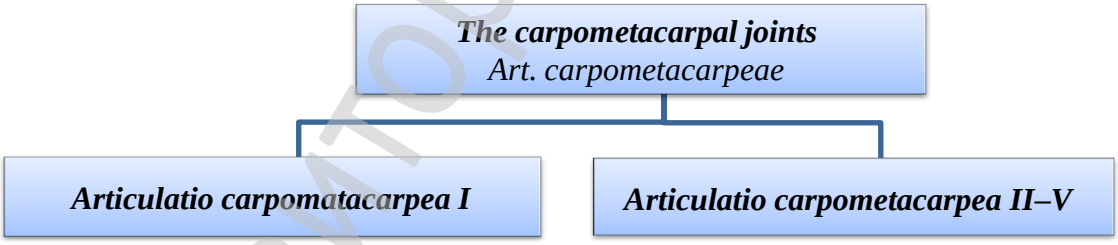

Figure 10.15 — The carpometacarpal joints

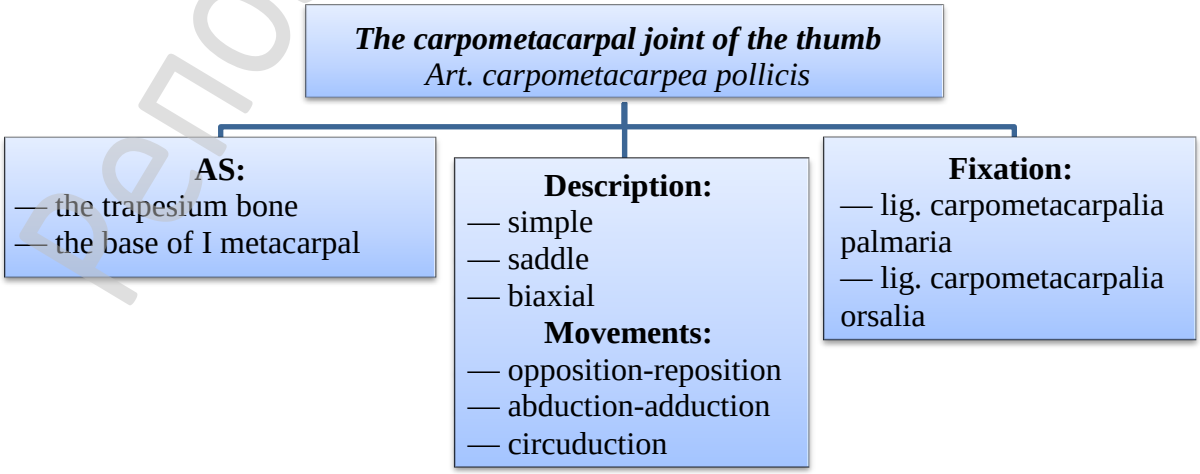

Figure 10.16 — The carpometacarpal joint of the thumb

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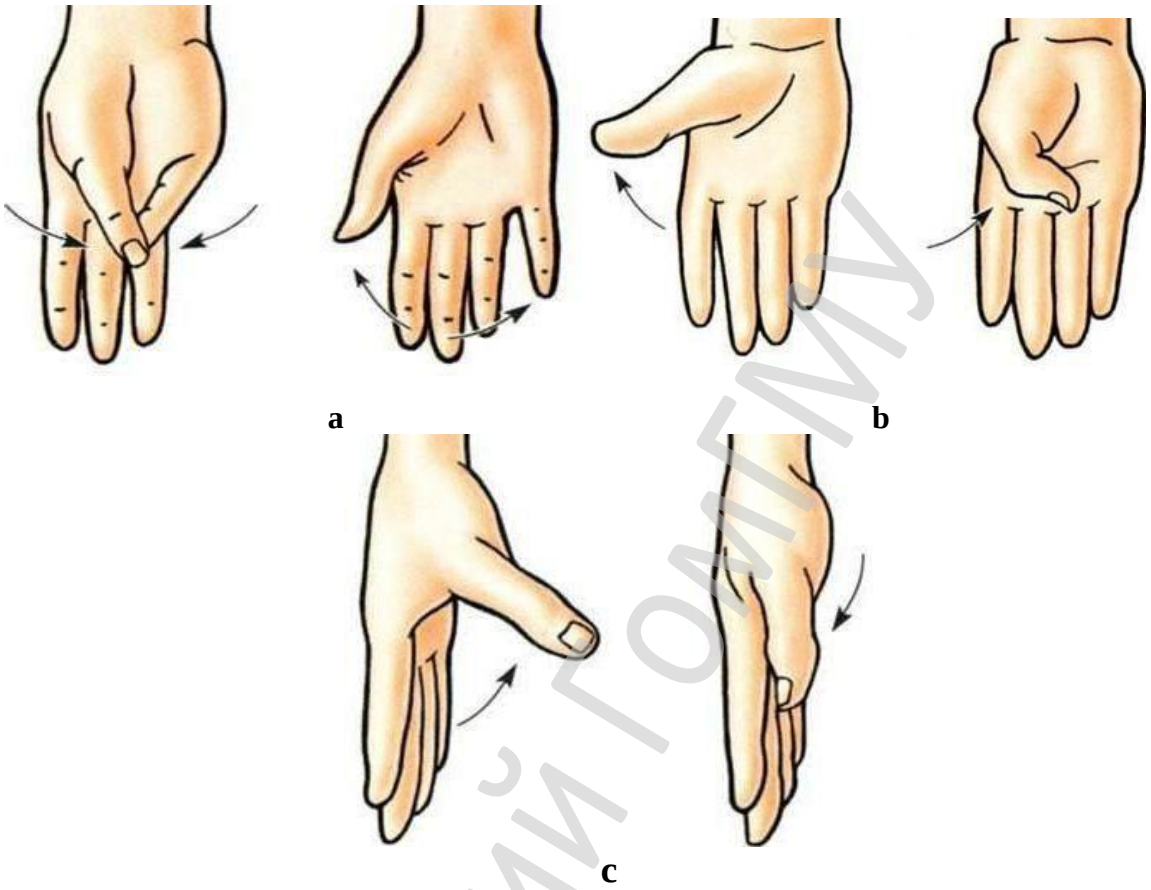

Figure 10.17 — Movements in the carpometacarpal joint of the thumb: a — opposition; b — abduction- adduction; c — flexion-extension

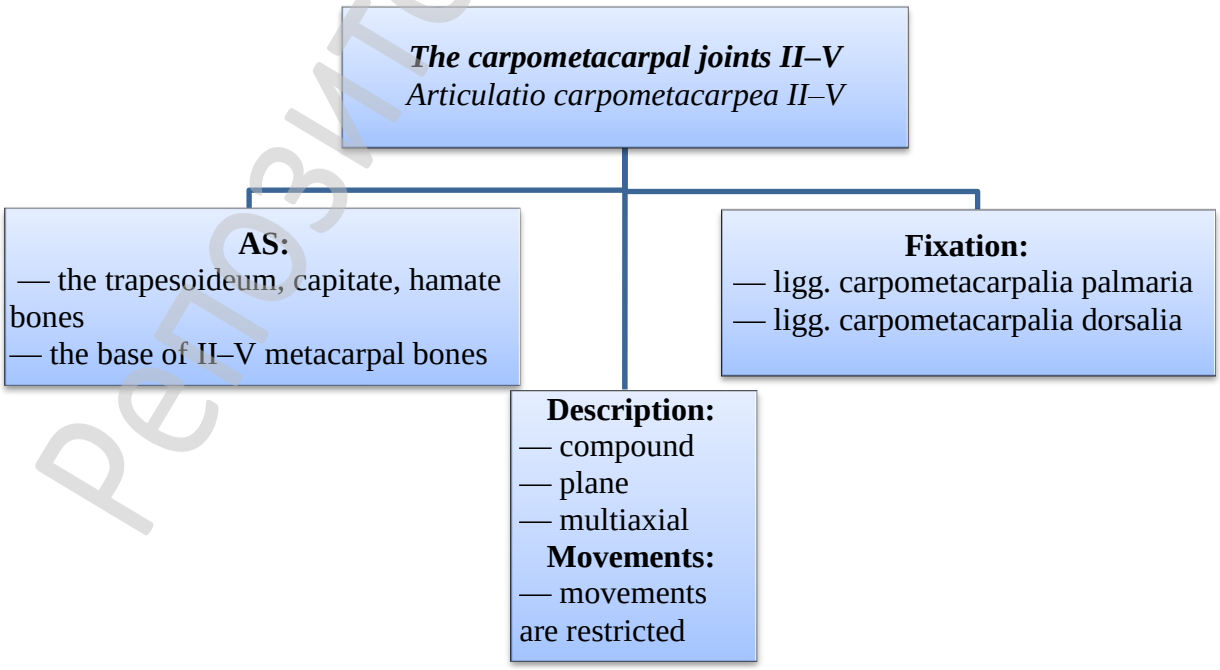

Figure 10.18 — The carpometacarpal joints II–V

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The palmar carpometacarpal ligaments *(ligg. carpometacarpalia palmaria)* connect the carpal and metacarpal bones on their palmar surfaces.

The dorsal metacarpal ligament *(ligg. carpometacarpalia dorsalia)* is the strongest and most distinct ligament and connects the carpal and metacarpal bones on their dorsal surfaces.

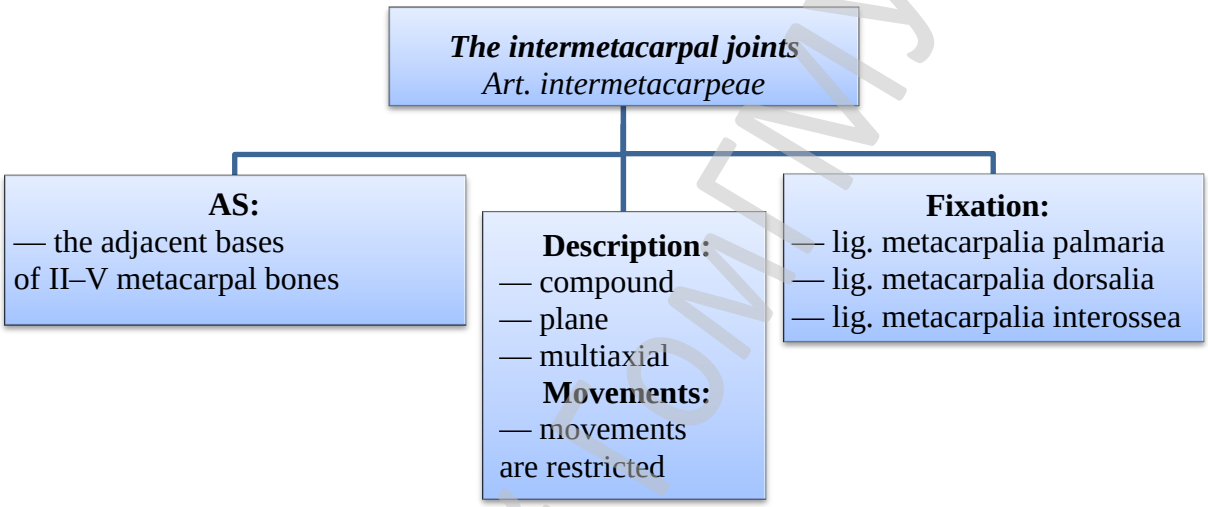

Figure 10.19 — The intermetacarpal joints

The dorsal and palmar metacarpal ligaments *(lig. matacarpalia dorsalia et palmaria)* pass transversely from one bone to another on the dorsal and palmar surfaces of the bases of the 2nd, 3rd, 4th and 5th metacarpal bones that articulate with one another by small surfaces covered with cartilage.

The interosseous metacarpal ligaments *(lig. matacarpalia interossea)* are short, thick fibers and connect the contiguous inferior angles of the capitate and hamate with the adjacent surfaces of the 3rd and 4th metacarpal bones.

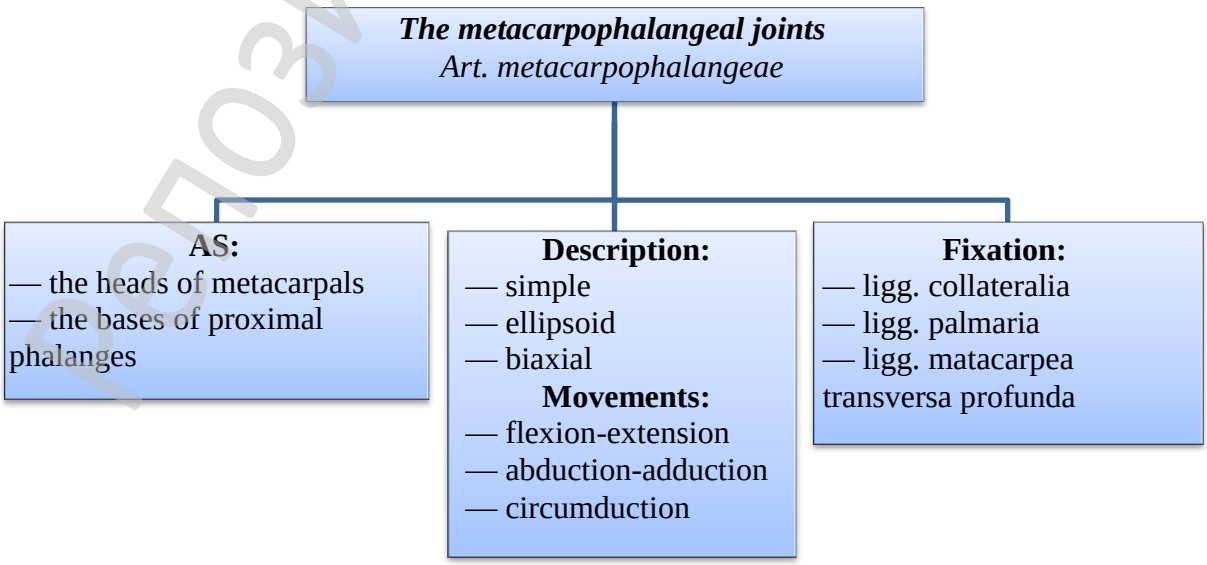

Figure 10.20 — The metacarpophalangeal joints

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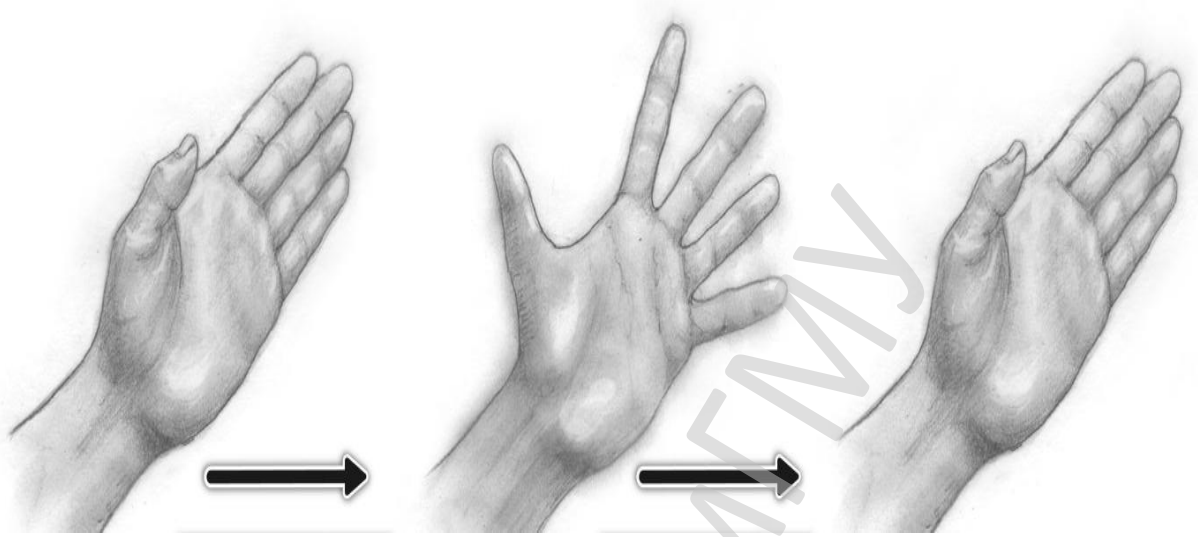
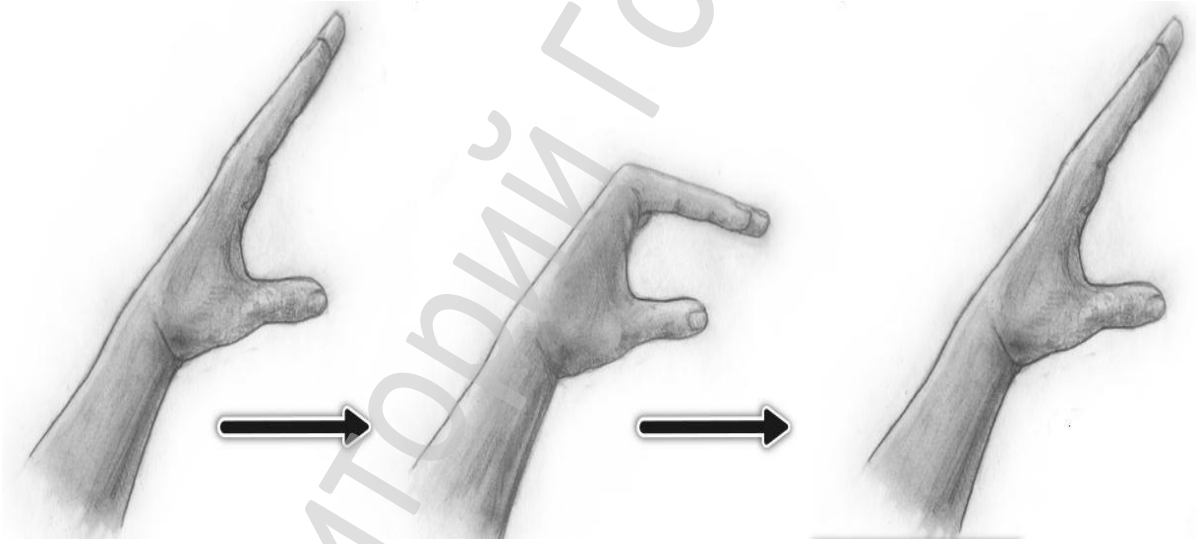


a



b

Figure 10.21 — Movements of carpometacarpal joints II–V:
a — abduction-adduction; b — flexion- extension

The collateral ligaments *(ligg. collateralia)* are strong, rounded cords, placed on the sides of the joints. It passes from the posterior tubercle and adjacent to the depression on the side of the head of the metacarpal bone to the contiguous extremity of the phalanx.

The palmar ligaments *(ligg. palmaria)* are a strong fibrocartilaginous plate which replaces the anterior part of the capsule.

The deep transverse metacarpal ligaments *(ligg. metacarpea transversa profunda)* connect the palmar ligaments to one another.

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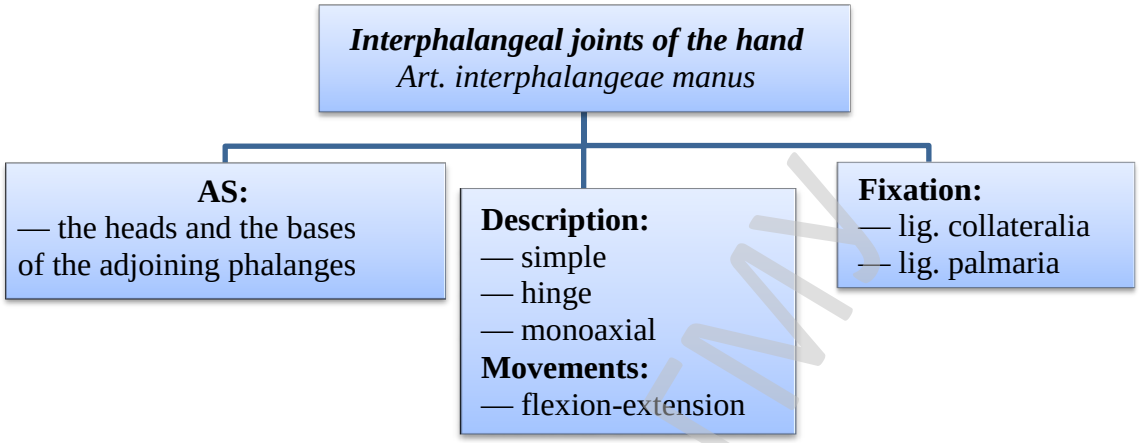

Figure 10.2 — Interphalangeal joints

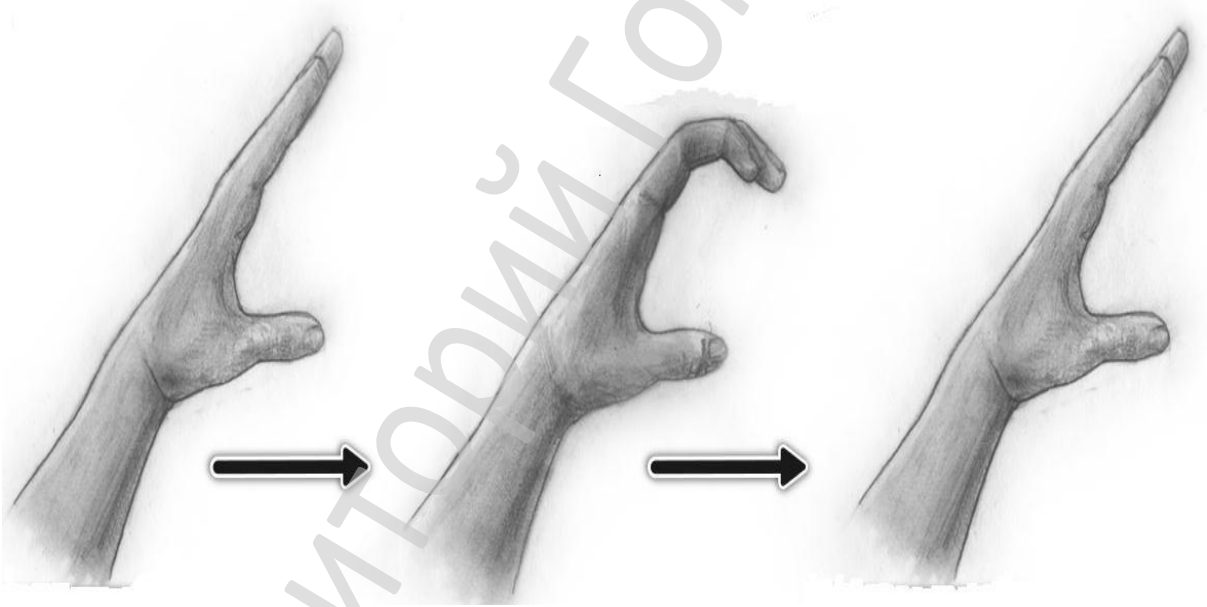

Figure 10.23 — Movements of the interfalangeal joints

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11. THE PELVIS AS A WHOLE

The pelvis is made up of two hip bones and sacrum. It connects the trunk with lower limbs. Connected together these 3 bones compose bony ring that lodges the viscera, called pelvic cavity.

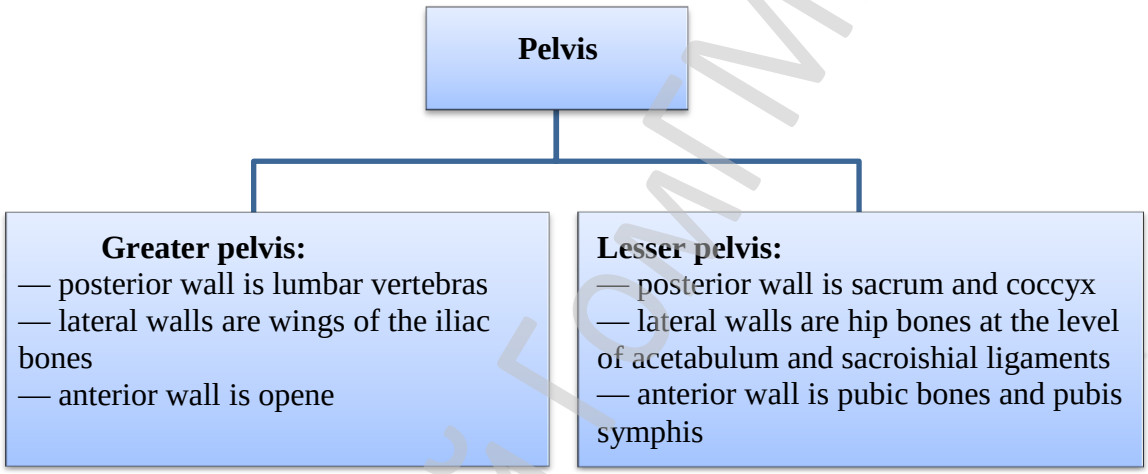

Figure 11.1 — The pelvic cavity

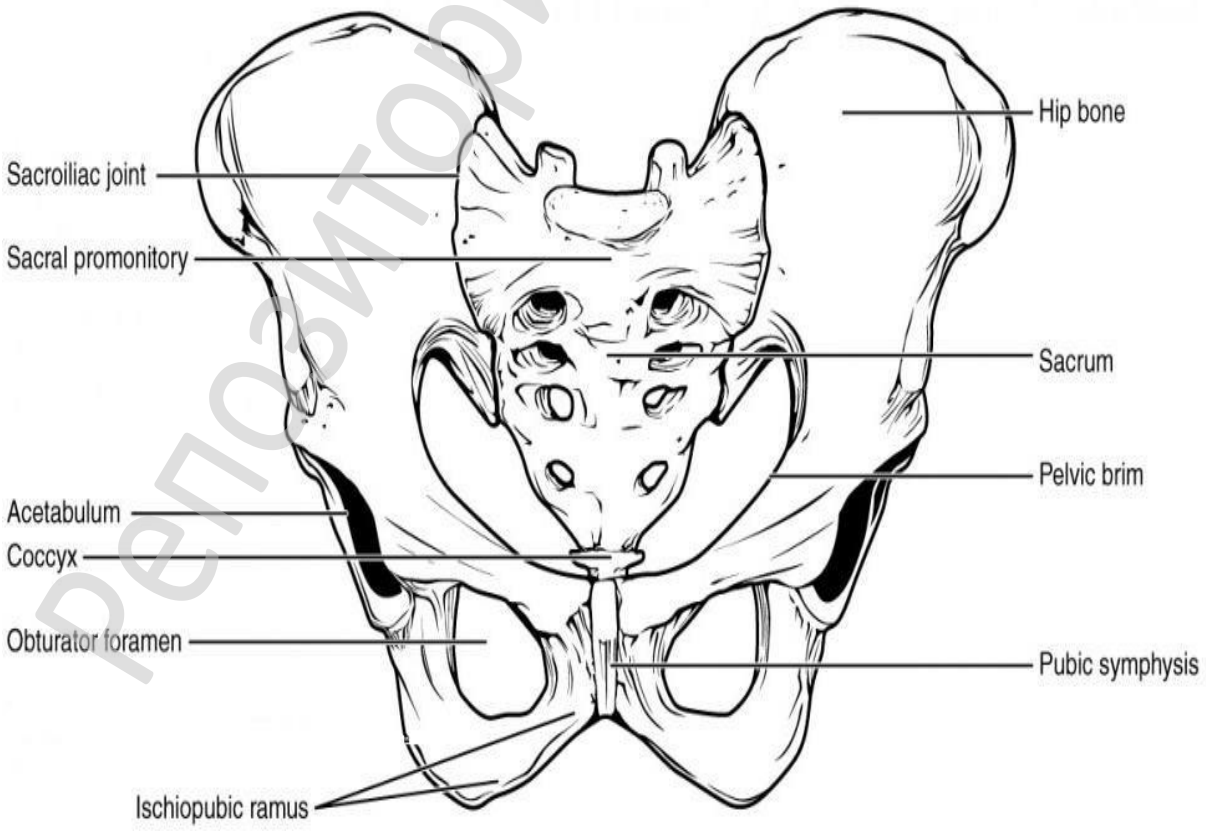

Figure 11.2 — The pelvis

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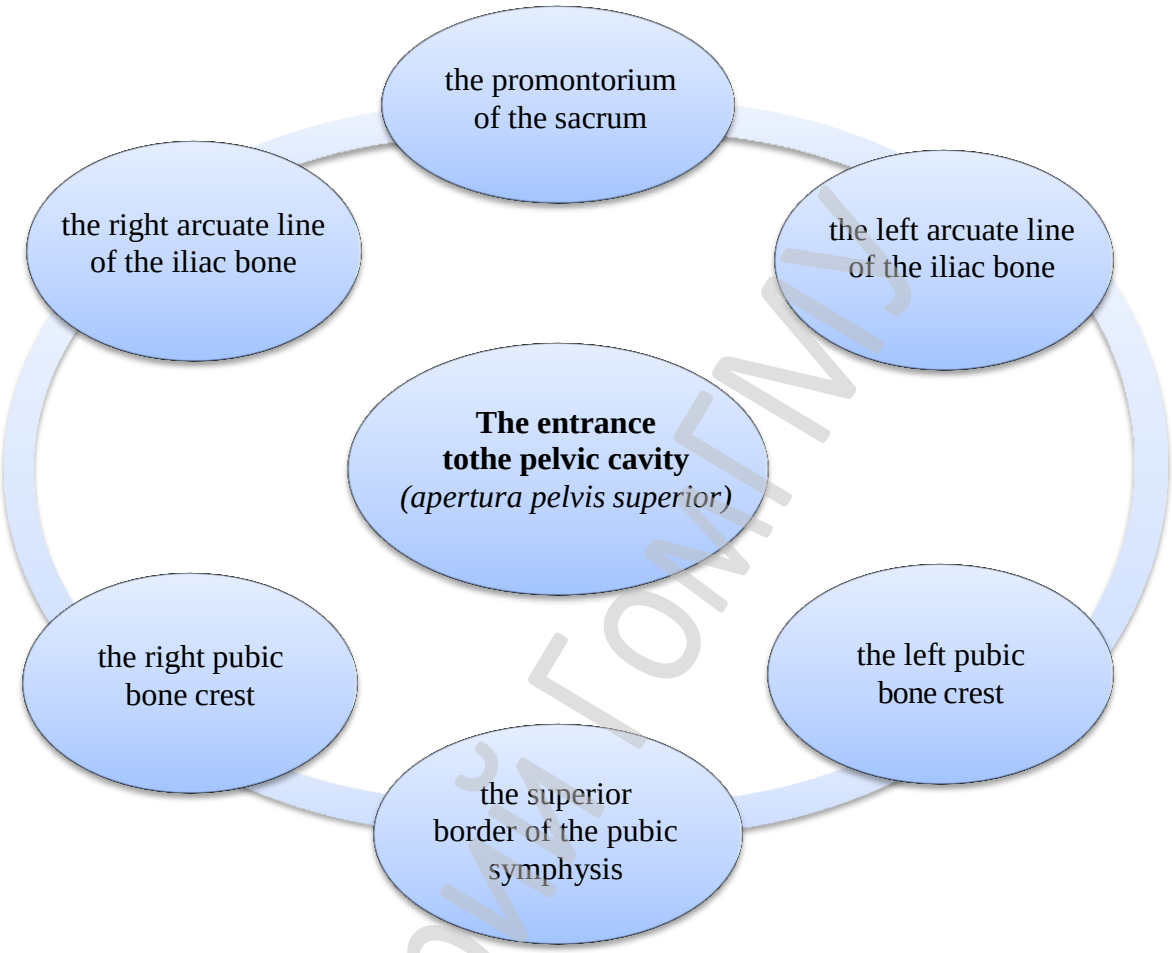

Figure 11.3 — The pelvic inlet

The greater pelvis (*pelvis major*) and ***the lesser pelvis*** (*pelvis minor*) are separated by pelvic brim, or *linea terminalis.*

It forms ***the pelvic inlet*** (*apertura pelvis superior*), or pelvic brim is the entrance to the pelvic cavity.

The borders of the pelvic inlet:

- the promontorium — posterior;
- the arcuate line — lateral;
- the pectin pubis — lateral;
- the superior border of the pubic symphysis — anterior.

The pelvic outlet (*aperture pelvis inferior*) is the exit from the pelvic cavity.

The borders of the pelvic outlet:

- the ramus of the pubis — anteriorly;
- the ramus of the ischium — laterally;
- the ischial tuberosity — laterally;
- the sacrotuberous ligament — laterally;
- the coccyx — posteriorly.

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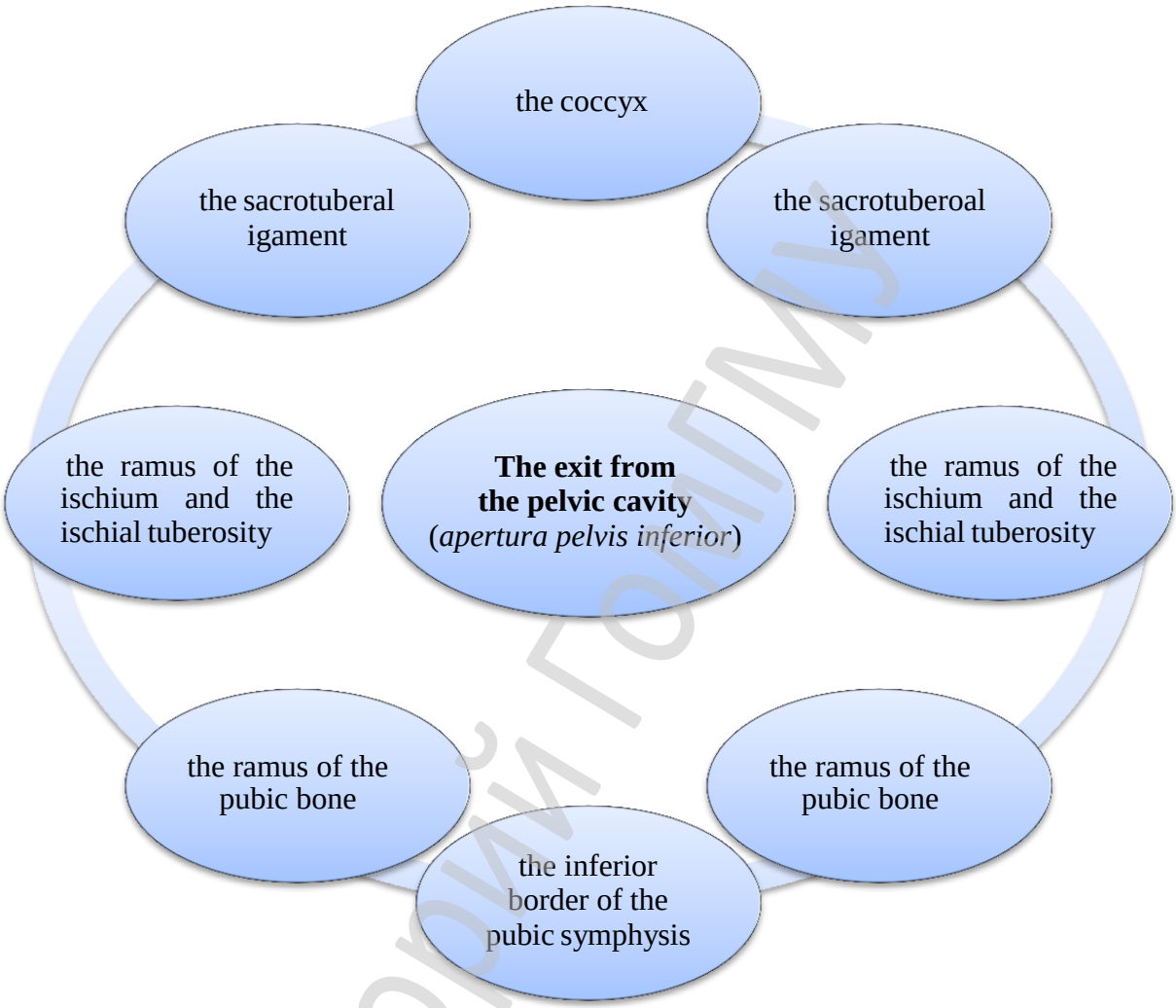

Figure 11.4 — The pelvic outlet

Differences between male and female pelvis begin to be manifested most sharply with the onset of puberty. They include the following:

— the bones of the female pelvis are generally thinner and smoother;
— the iliac wings are spread out more widely in females;
— the inlet of the pelvis is transversely oval in females;
— the promontory projects farther forward in a male pelvis;
— the female sacrum is wider and flatter;
— the protrusion of the coccyx to the front is lesser in females;
— the outlet is much narrower in males;
— in females the ischial tuberosities are further apart;
— the pubic arc is wider in females;
— the pelvic cavity is more cilindric in a female pelvis.

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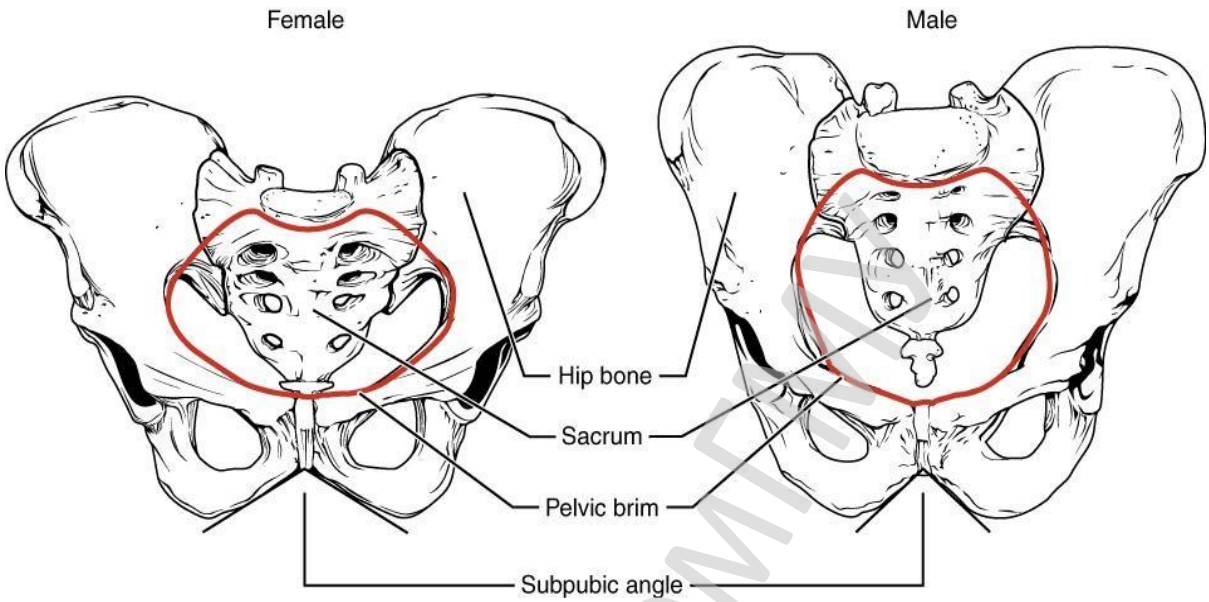

Figure 11.5 — Sex difference of the pelvis

Demensions of pelvis

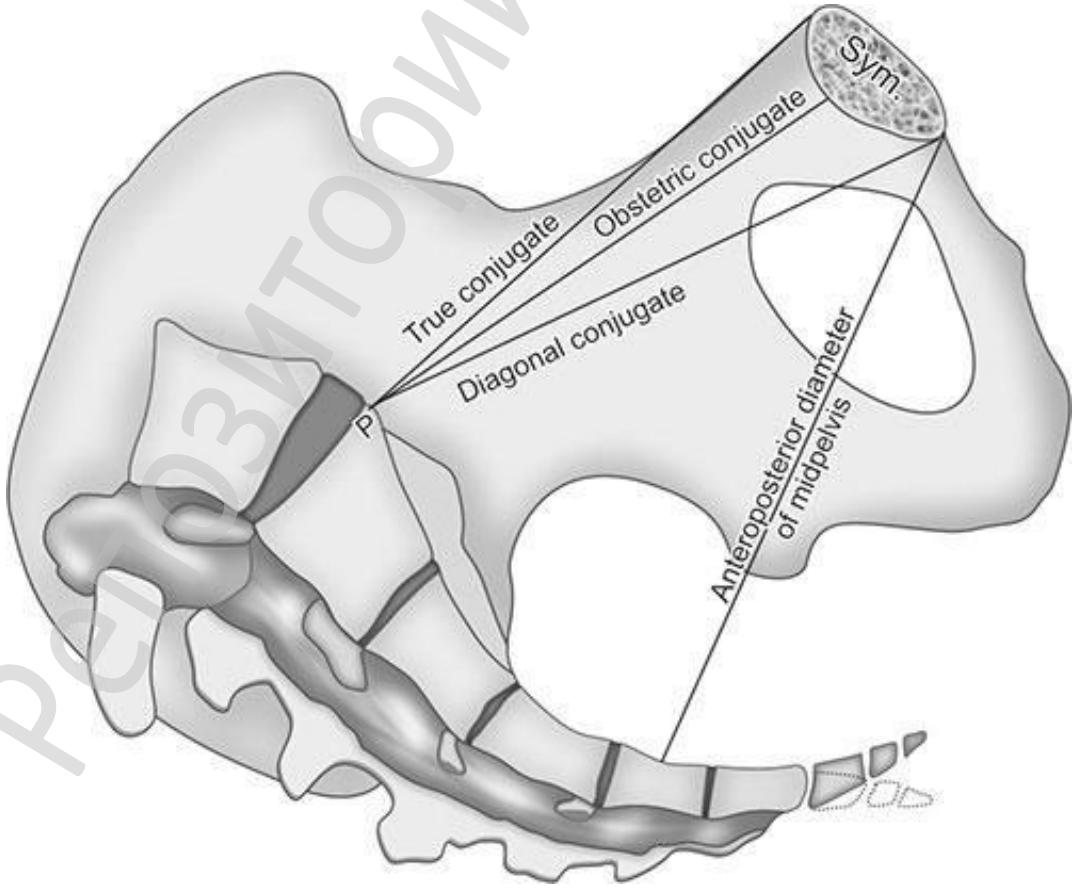

Figure 11.6 — Dimensions of pelvis in a sagittal section

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The measurements of three pelvic regions are important in order to be able to recognize any abnormality in the size or shape of the pelvis that may affect the care given to pregnant woman; as the fetal head has to negotiate its way through the pelvis to be born.

The disproportion b/w the fetus and maternal birth canal can result in maternal and/or fetal injuries or even death.

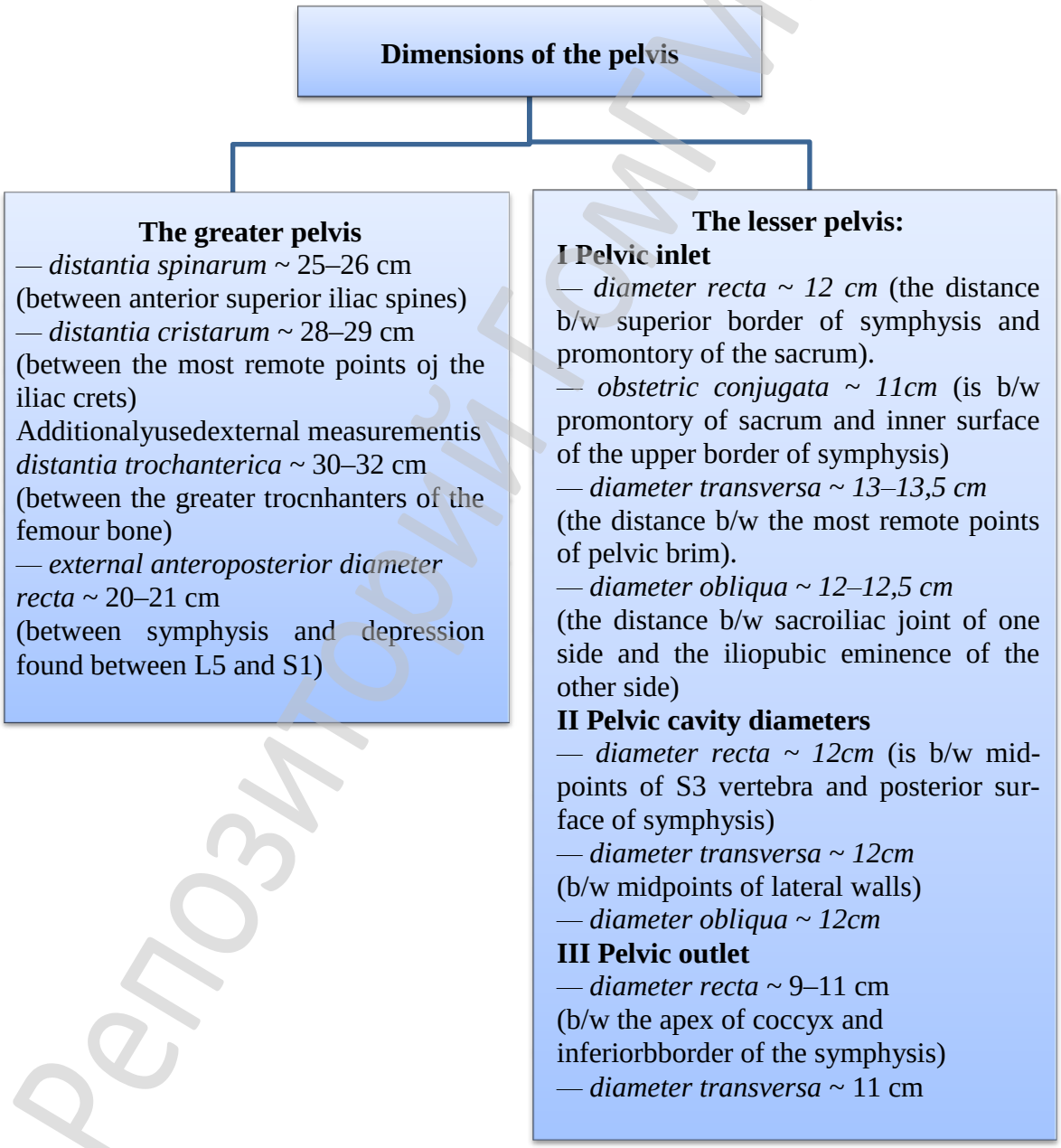

Figure 11.7 — Measurements of the pelvis

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12. ARTICULATIONS OF THE PELVIC GIRDLE

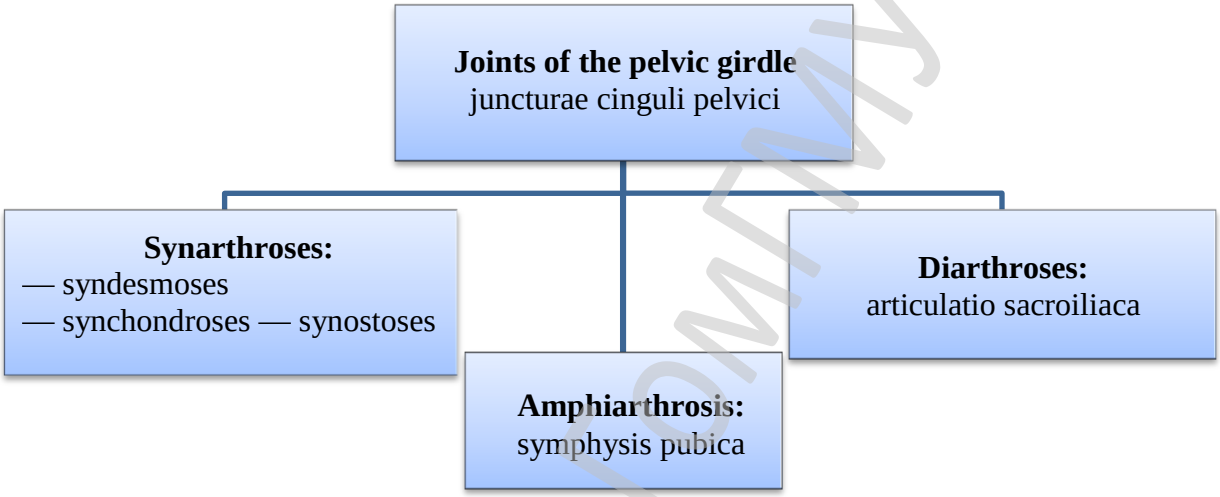

Figure 12.1 — Joints of the pelvic girdle

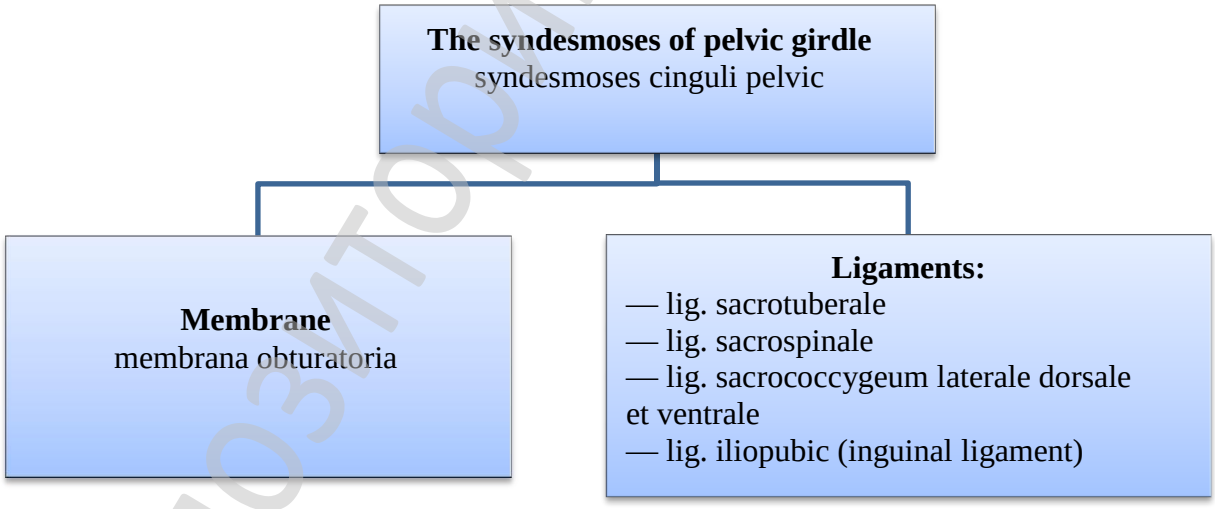

Figure 12.2 — The syndesmoses of the pelvic girdle

The sacrotuberous ligament *(lig. sacrotuberale)* passes from the ishiadic tuber to lateral surface of the sacrum and coccygeum.

The sacrospinous ligament *(lig. sacrospinale)* passes the ishiadic spine to the sacrum and coccyx.

The sacrotuberous ligament converts the sciatic notches into foramina, which are separated from each other by the sacrospinous ligament.

The greater sciatic foramen transmits the piriformis muscle, superior and inferior gluteal vessels and nerves, pudendal vessels and nerve, sciatic and pos-

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terior femoral cutaneous nerves, and nerves to the intenal obturator and quadratus femoris muscles.

The lesser sciatic foramen transmits the obturator internus muscle tendon, the nerve to the obturator internus, and the pudendal vessels and nerve.

The inguinal ligament (*lig. inguinale*) is the part of the aponeurosis of the abdomen.

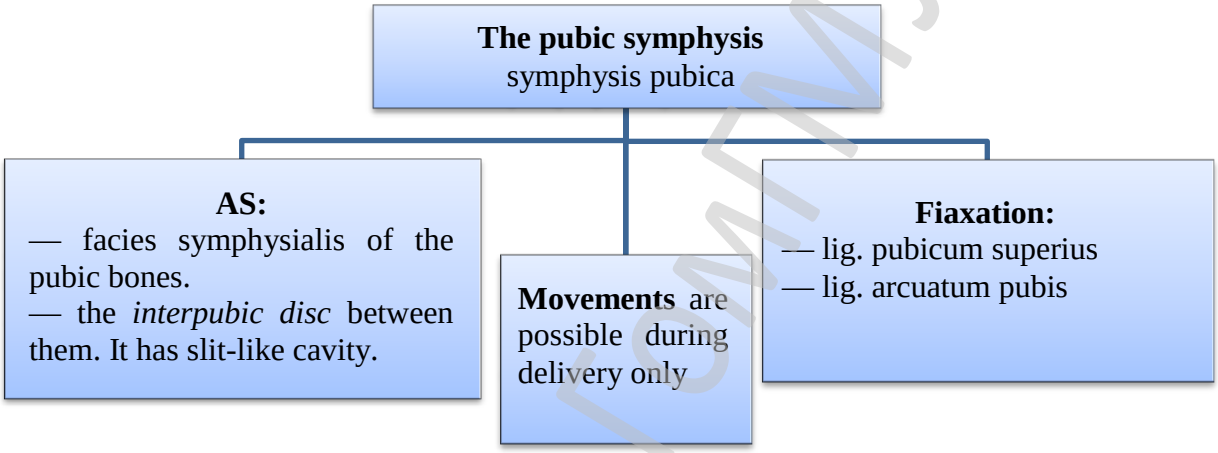

Figure 12.3 — The pubic symphysis

The symphysial surfaces of pubic bones are covered by a thin layer of hyaline cartilage. They attach by an interpubic disc of fibrous cartilage. The fibrous cartilage disc may contain a fluidfilled cavity is a cleft, homologous of pulpous core of intervertebral disc.The center is avascular.

The superior pubic ligament *(lig. pubicum superius)* connects together the two pubic bones superiorly, extending laterally as far as the pubic tubercles.The strong and thicker superior ligament is reinforced by the tendons of the rectus abdominis muscle, the abdominal external oblique muscle, the gracilis muscle, and by muscles of the hip.

The arcuate pubic ligament *(lig. arcuatum pubis) (the inferior pubic ligament or subpubic ligament)* is a thick, triangular arch of ligaments, connecting together the two pubic bones below, and forming the upper boundary of the pubic arch.

The ligaments around the pubis become relaxed during pregnancy.

In males, the suspensory ligament of the penis attaches to the pubic symphysis.

The articular surfaces are covered by two different kinds of cartilage: the sacral surface has hyaline cartilage and the iliac surface has fibrous cartilage.

The articular capsule of the sacroiliac joint is very strong. It fuses with the periosteum of the sacrum and the iliac bone and with the ligaments that strengthen the joint.

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In humans, the sacrum supports the spine and is supported in turn by an ilium on each side. The joint's surfaces are flat or planar in early life but as we start walking, the sacroiliac joint surfaces develop distinct angular orientations and lose their planar or flat topography.

The fossae lumbales laterals («dimples of Venus») correspond to the superficial topography of the sacroiliac joints.

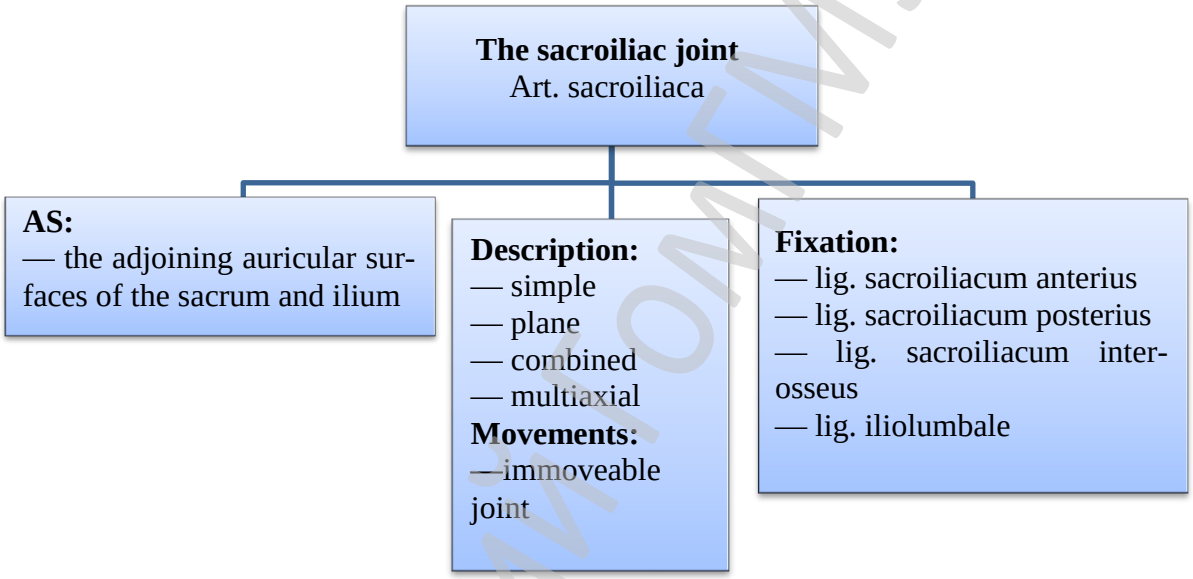

Figure 12.4 — The sacroiliac joint

The anterior sacroiliac ligament *(lig. sacroiliacum anterius) is a* thin bandle, which pass from the anterior surface of the lateral part of the sacrum to the margin of the auricular surface of the ilium and to the preauricular groove.

The posterior sacroiliac ligament *(lig. sacroiliacum posterius) i*s situated in a deep depression between the sacrum and ilium behind. It's strong and forms the chief bond of union between the bones. It consists of numerous fascicules, which pass between the bones in various directions.

The interosseous sacroiliac ligament *(lig. sacroiliacum interosseus)* is a short bandle of strong fibers, which pass from sacral tubeosities to ilium.

The iliolumbar ligament *(lig. iliolumbale)* passes laterally from transverse process of the Vth lumbar vertebra to the pelvis. It's divided into two main bands. The lower band runs to the base of the sacrum, blending with the anterior sacroiliac ligament. The upper band attaches to the crest of the ilium immediately in front of the sacroiliac articulation, and are continuous above with the lumbodorsal fascia.

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13. ARTICULATIONS OF FREE LOWER LIMB

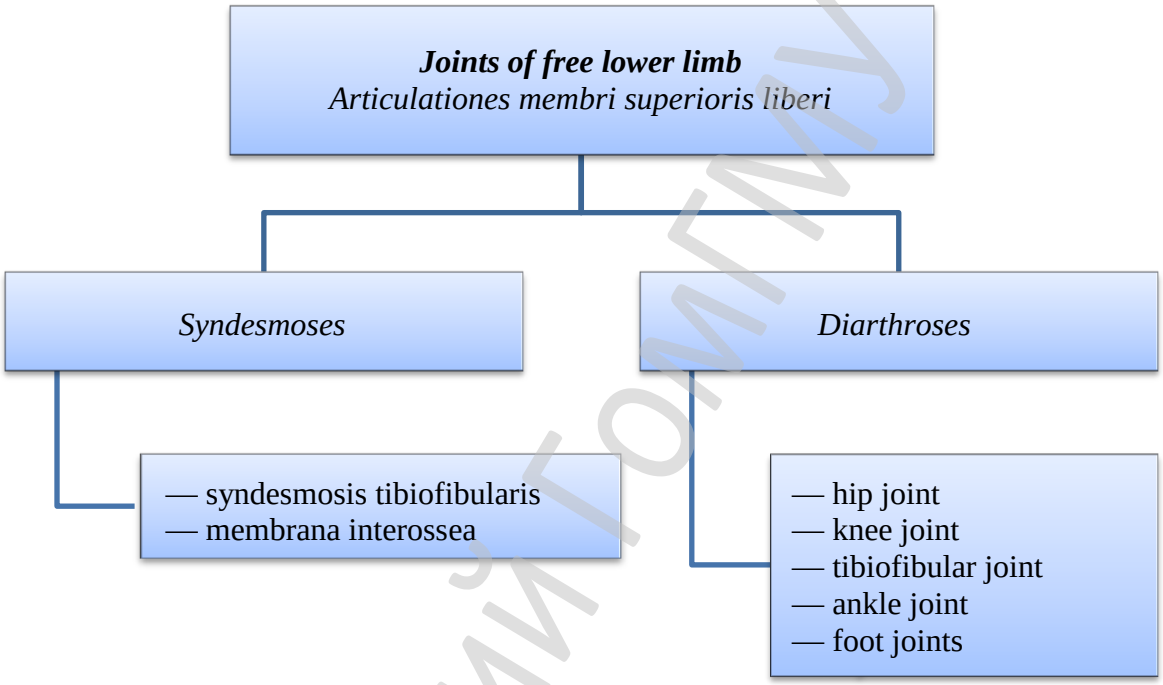

Figure 13.1 — Joints of free lower limb

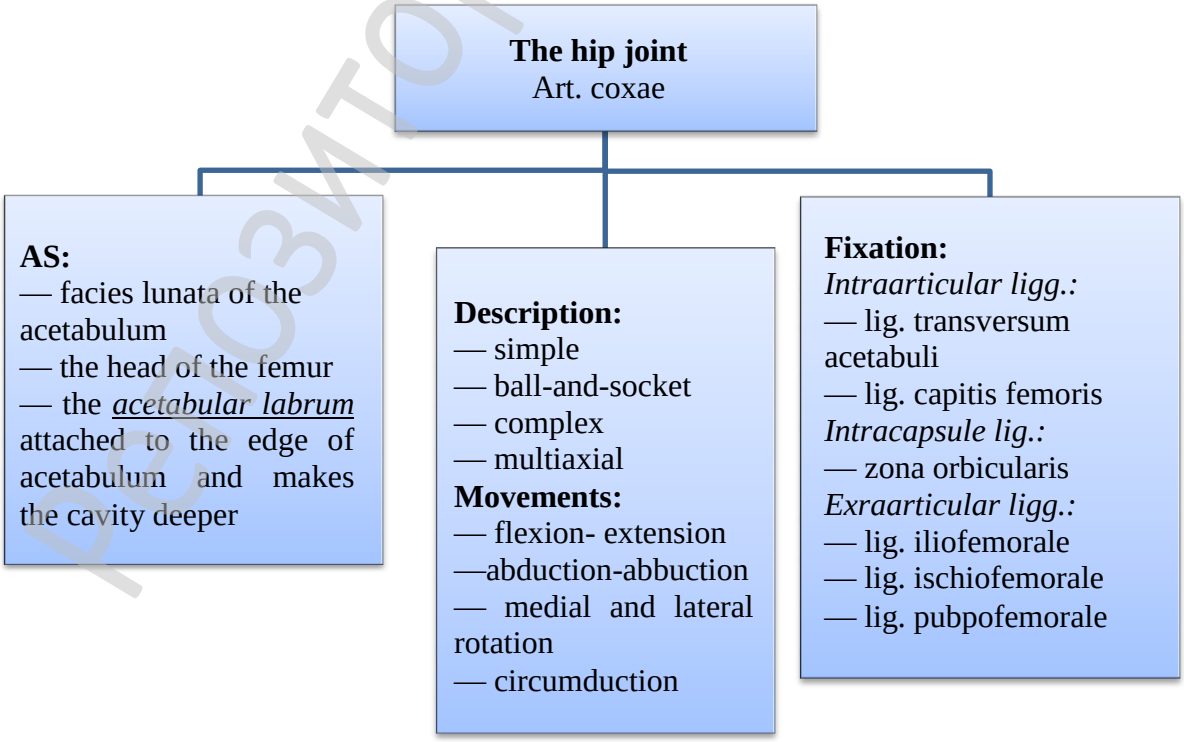

Figure 13.2 — The hip joint

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The transverse ligament *(lig. transversum acetabuli)* is a part of the ace- tab- ular labrum and connects the acetabular notch and makes a foramen for transmitting vessels and nerves.

The ligament of the femur head (lig. capitis femoris) passes from the acetabular fossa to the fovea of the femur.

The inner circular fibers of the capsule called ***zona orbicularis***.

The iliofemoral ligament *(lig. iliofemorale)* passes from the anterior inferior iliac spine to the intertrochanteric line of the femur. It has a «Y» shaped appearance and prevents hyperextension of the hip joint and falling of the trunk backwards while standing.

The pubofemoral ligament *(lig. pubofemorale)* passes from the superior pubic rami to the medial side of the intertrochanteric line of the femur. It has a triangular shape and prevents excessive abduction and extension.

The ischiofemoral ligament *(lig. ischifemorale)* passes from the body of the ischium to the fossa trochanterica of the femur. It has a spiral orientation and prevents excessive extension.

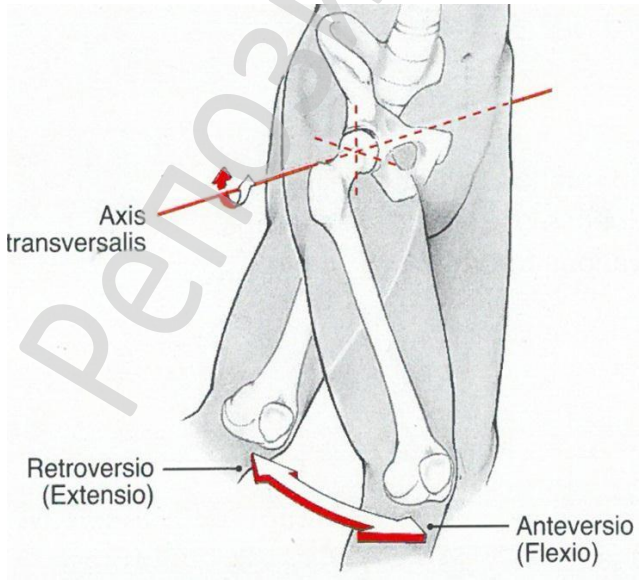
Stabilizing factors.

The primary function of the hip joint is to *weight-bear*.

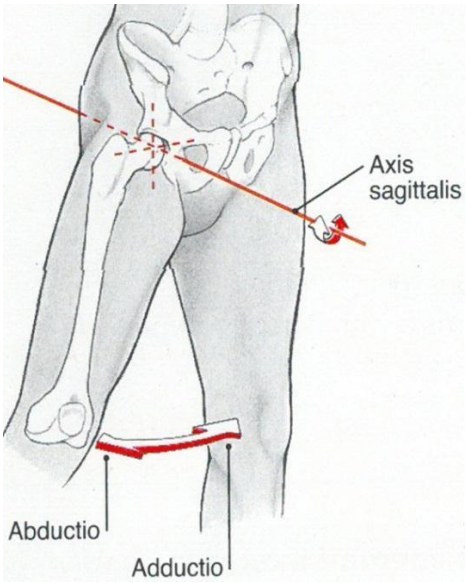
The *acetabulum* is a deep and encompasses nearly all of the head of the femur. This decreases theprobabilityof the head slipping out of the acetabulum (dislocation).

The *acetabular labrum* is a fibrocartilaginous rim around the acetabulum. It increasesthe depth and provides a larger articular surface, further improving the stability of the joint.

The *iliofemoral, pubofemoral and ischiofemoral ligaments* are very strong and along with the thickened joint capsule, provide a large degree of stability. These ligaments have a unique *spiral orientation.*



a



b

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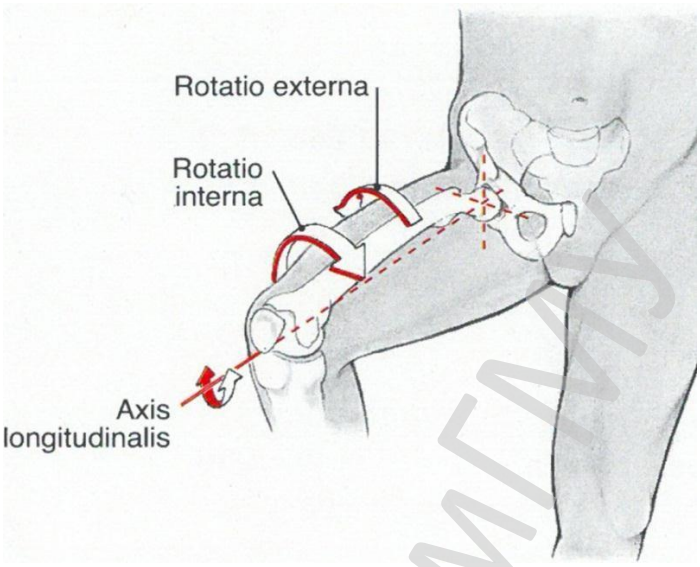

c

Figure 13.3 — Movements of the hip joint: a — flexion, b — abduction, c — rotation

The knee joint
Art. genus

AS:
— the condyles of the femour
— the condyles of the tibia
— the articular surface of patella.
— the surfaces are complemented by *meniscus*

Description:
— compound
— bicondular
— complex
— biaxial

Movements:
— flexion - exension
— rotation, but only when the joint is flexed

Fixation:
Intra-articular ligg.:
— lig. cruciatum anterius
— lig. cruciatum posterius
— lig. transversum genus
— lig. meniscofemorale anterius
— lig. meniscofemorale posterius
Extra-articular ligg.:
— lig. collaterale fibulare
— lig. collaterale tibiale
— lig. patellae
— retinaculum patellae laterale
— retinaculum patellae mediale
— lig. popliteum obliquum
— lig. popliteum arcuatum

Figure 13.4 — The knee joint

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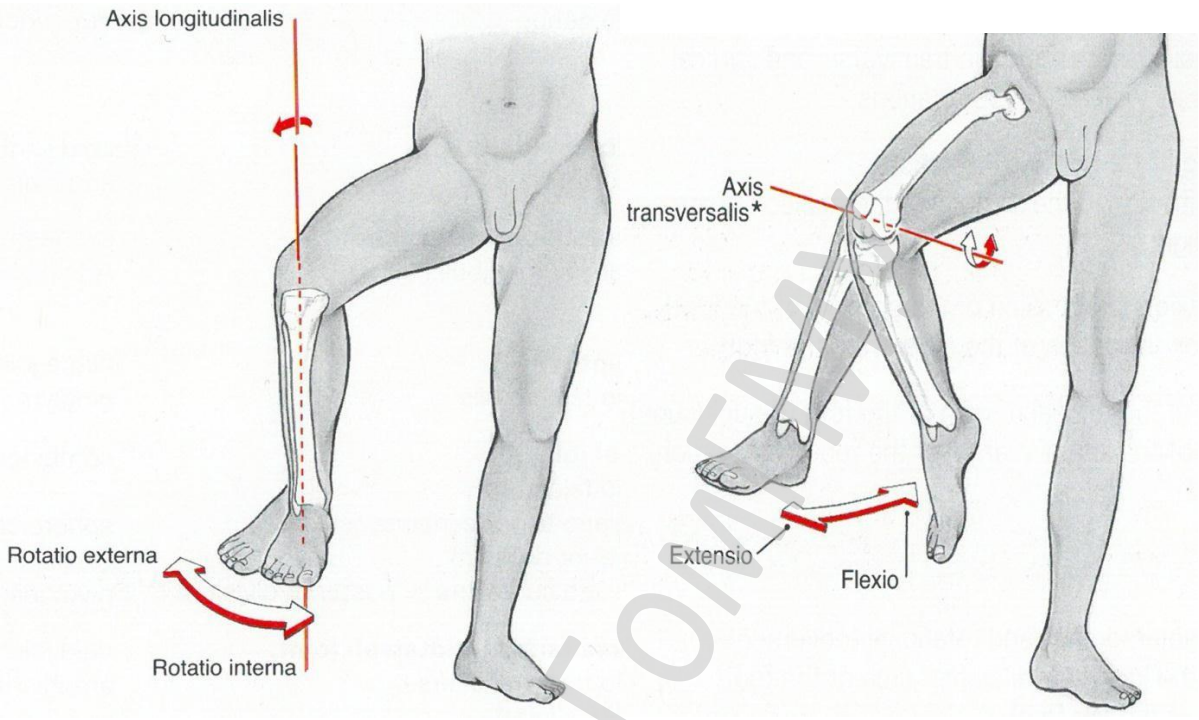

a **b**

Figure 13.5 — Movements in the knee joint: a — rotation; b — flexion

The outer layer of the capsule is made of fibrous connective tissue continuous with the ligaments of the knee to hold the joint in correct position. The synovial membrane that lines the inner joint capsule produces oily synovial fluid, which fills the hollow space between the bones, lubricates the knee cartilages and reduces friction and wear.

The cruciate ligaments are very thick and strong fibrous bands, which act as direct bonds of union between tibia and femur. ***The anterior cruciate ligament*** *(lig. cruciatum anterius)* straches between anterior intercondylar area of tibia and lateral condyle of femur and taut during extension of knee. ***The posterior cruciate ligament*** *(lig. cruciatum posterius)* starches between posterior intercondylar area of tibia and medial condyle of femur and taut during flexion of knee.

The transverse ligament *(lig. transversum genus)* connects the anterior ends of the medial and lateral menisci.

The anterior meniscofemoral ligament *(lig. meniscofemorale anterius) (ligament of Humphrey)* passes from the posterior horn of the lateral meniscus and passes superiorly and medially in front of the posterior cruciate ligament and connects with the anterior cruciate ligament.

The posterior meniscofemoral ligament *(lig. meniscofemorale anterius) (ligament of Wrisberg)* passes upward and medially behind the attachment of the posterior cruciate ligament, to the medial condyle of the femur.

Meniscs (*meniscus lateralis et medialis*) are semilunar cartilages of tough, rubbery fibrous cartilage between the femur and tibia, which change their shape and position at movements. They make the articular surfaces more congruent

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and movements more smooth. The meniscus acts as a shock absorber inside the knee toprevent the collision of the leg bones during strenuous activities such as running and jumping.

The fibular collateral ligament *(lig. collaterale fibulare)* is a strong, fibrous cord that passes from the lateral epicondyle of the femur to the lateral side of the head of the fibula. The ligament has no attachment to the lateral meniscus.

The tibial collateral ligament *(lig. collaterale tibiale)* is a broad, flat, membranous band that passes from the medial epicondyle of the femur to the medial condyle and medial surface of the body of the tibia.

The patellar ligament *(lig. patellae)* passes from the patella to the tuberosity of the tibia. It's a strong, flat, ligamentous band.

The medial and lateral portions of the tendon of the quadriceps femoris muscle pass down on either side of the patella and inserted into the upper part of tibia on either side of the tuberosity; forming ***the medial and lateral patellar retinacula.*** The lateral and medial retinaculi hold the kneecap (patella) in correct position when moving.On lateral sides the ligament separates from joints capsule by fatty tissue layer are an alar folds (plicae alares).

The oblique popliteal ligament *(lig. popliteum obliquum)* passes from the tendon of the semimembranosus muscle to the intercondylar line and lateral condyle of the femur.

The arcuate popliteal ligament *(lig. popliteum arcuatum)* passes to thehead of the fibula, arches over the tendon of the popliteus to the posterior surface of the intercondylar area of the tibia.

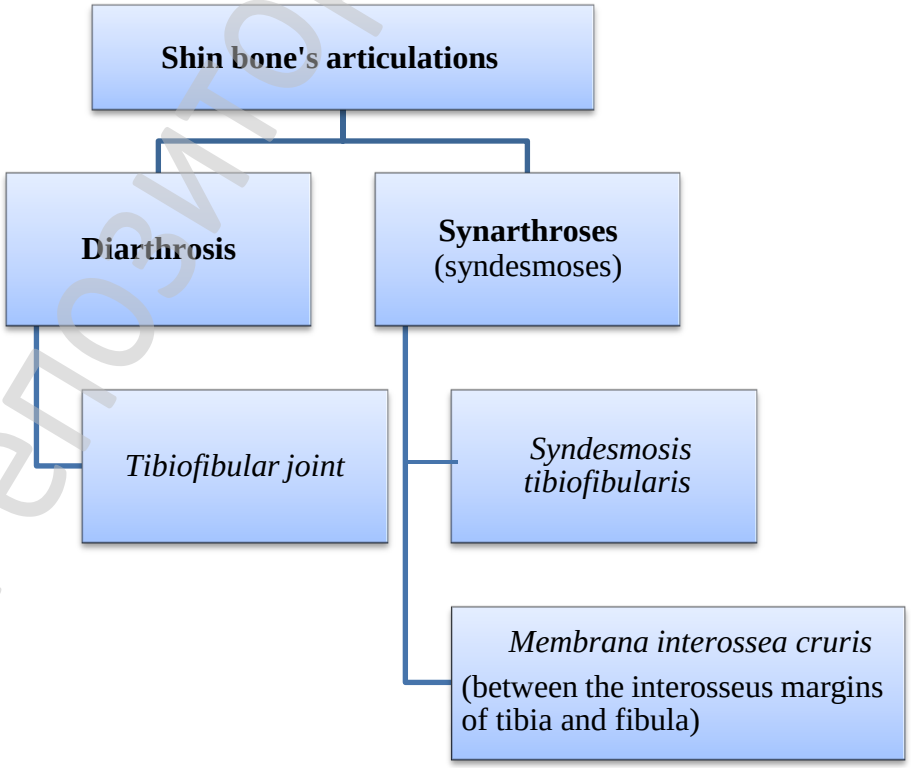

Figure 13.6 — Shin bone's articulations

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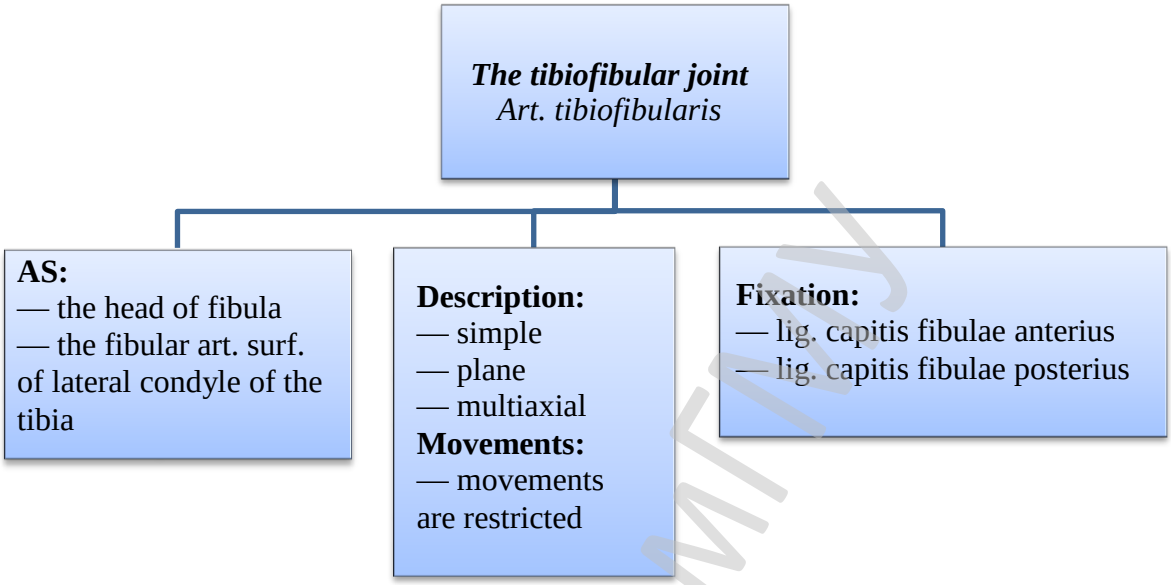

Figure 13.7 — The tibiofibular joint

The anterior ligament of fibular head *(lig. capitis fibulae anterius)* passes on anterior surface of joint's capsule and strengthens the articular capsule.

The posterior ligament of fibular head *(lig. capitis fibulae posterius)* is a thick bandle on posterior surface of joint's capsule.

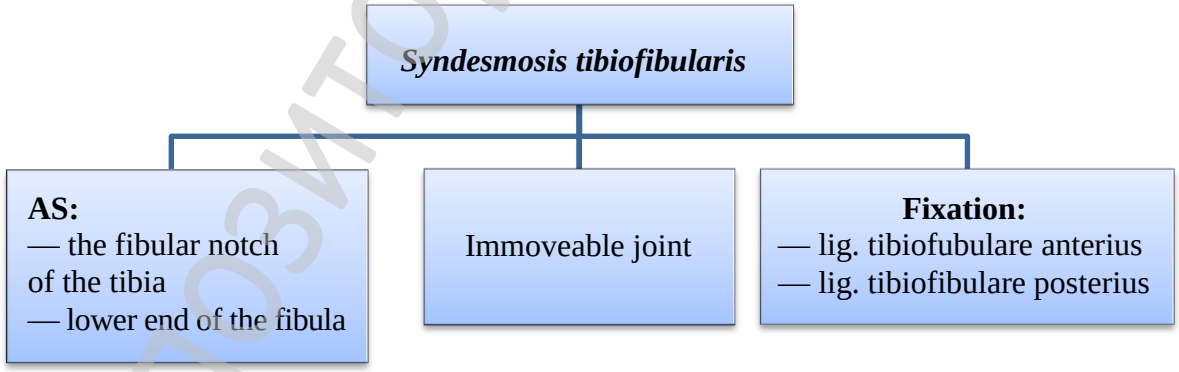

Figure 13.8 — Syndesmosis tibiofibularis

The anterior tibiofibular ligament *(lig. tibiofibulare anterius)* is a flat, triangular band of fibers, which extends obliquely downward and laterally between the adjacent margins of the tibia and fibula, on anterior surface of syndesmosis.

The posterior tibiofibular ligament *(lig. tibiofibulare posterius),* smaller than the anterior, disposed in a similar manner on posterior surface of the syndesmosis.

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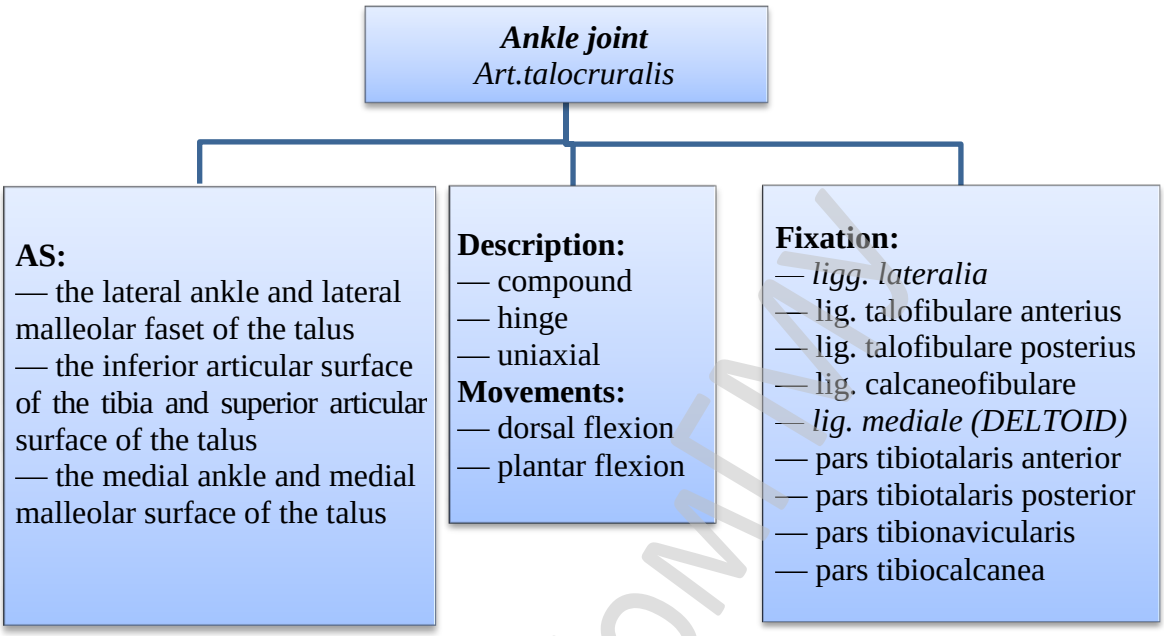

Figure 13.9 — The ankle joint

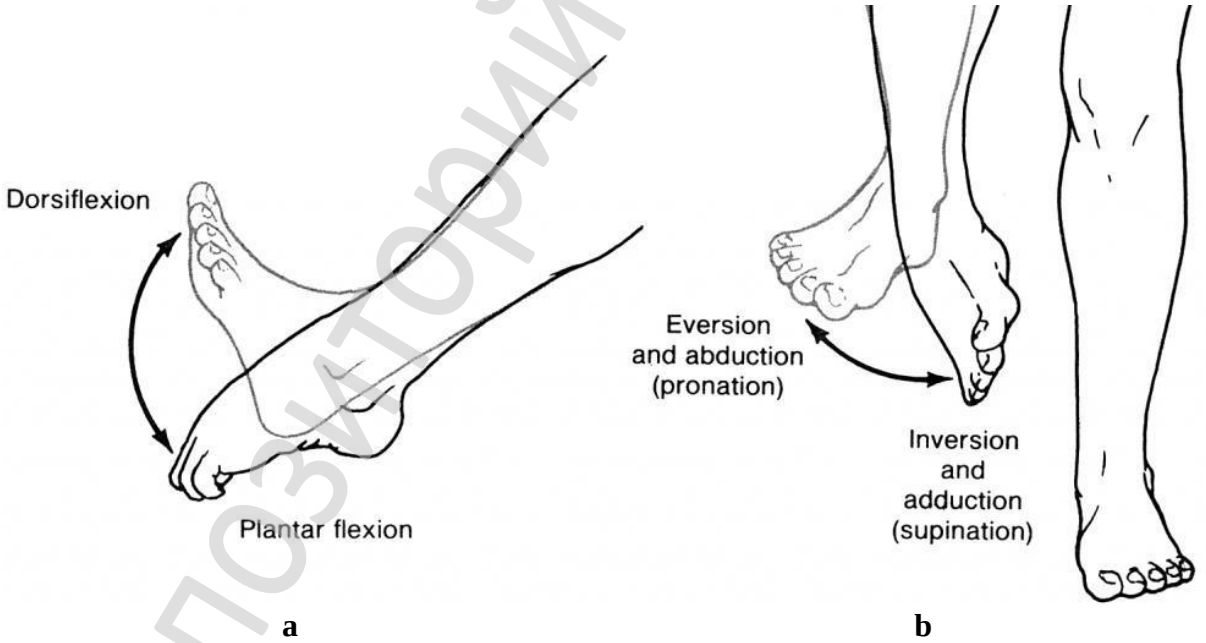

Figure 13.10 — Movements iof the ankle joint:
a — flexion-extension; b — eversion-inversion

The medial ligament, or deltoid *(lig. mediale)* passes from the medial malleolus to:

— *pars tibionavicularis* to the navicular (forwards)
— *pars tibiocalcanea* to the calcaneus (downwards)
— *pars tibiotalaris* to the talus (forwards and backwards).

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The lateral ligament *(lig. laterale)* passes from the lateral malleolus to:

— the calcaneus — *lig. calcaneofibulare* (downwards)

— the talus — *lig. talofibulare anterius et posterius* (forwards and backwards).

Articulations within bones of the foot

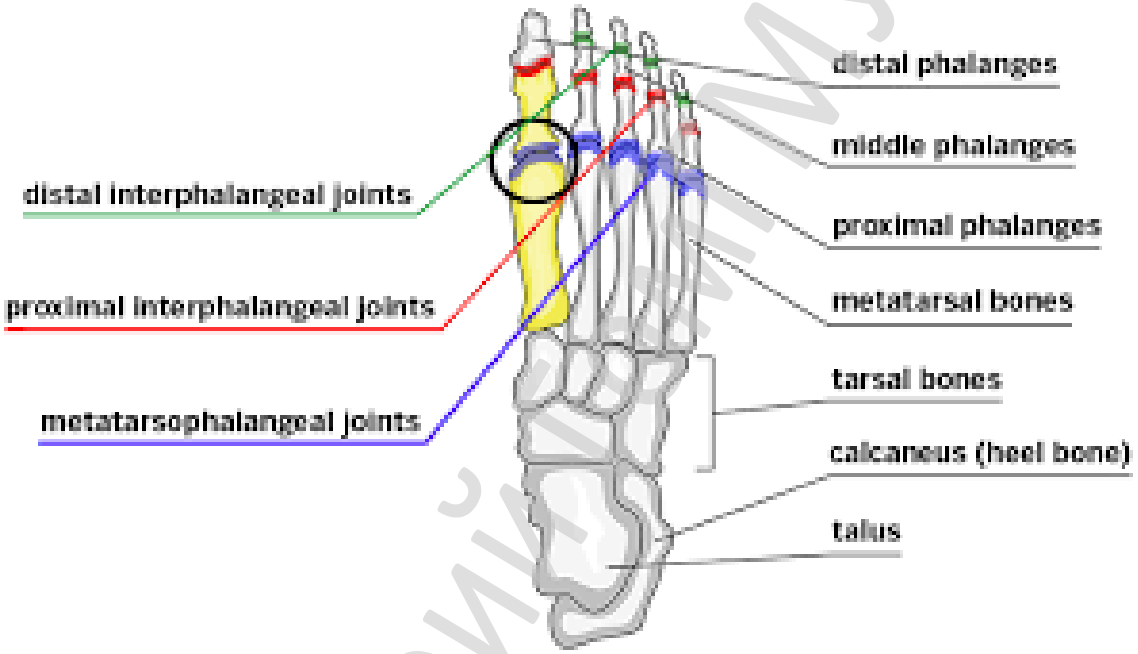

Figure 13.11 — The joints of foot

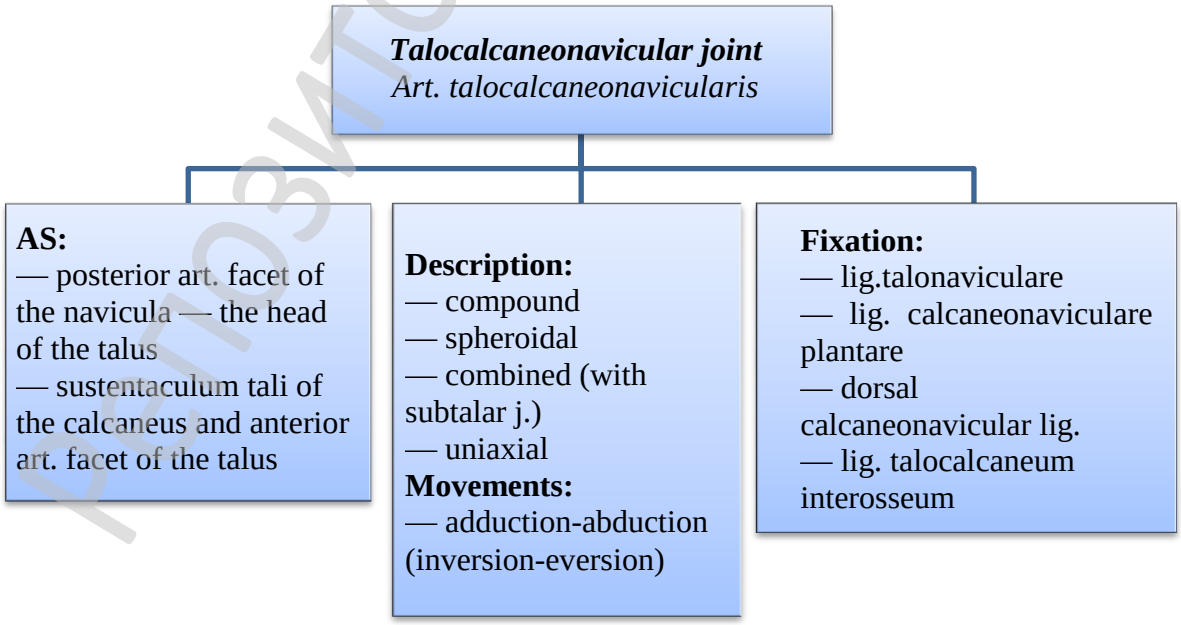

Figure 13.12 — Talocalcaneonavicular joint

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The plantar calcaneonavicular ligament *(lig. calcaneonaviculare plantare)* passes between the sustentaculum tali of calcaneus and posterior border of navicular. The ligament contains the cartilage that supports the head of the talus.

The talonavicular ligament *(lig. talonaviculare)* passes from the dorsal sur- face of the neckof the talus and the navicular.

The talocalcaneal interosseus ligament *(lig. talocalcaneum interosseum)* is in tarsal sinus.

The lateral talocalcaneal ligament *(lig. talocalcaneum laterale)* is a short, strong fasciculus between lateral surface of talus to the lateral surface of calcaneus. ***The medial talocalcaneal ligament*** *(lig. talocalcaneum mediale)* passes between medial tubercle of talus to sustentaculum tali. Its fibers blend with those of the plantar calcaneonavicular ligament.

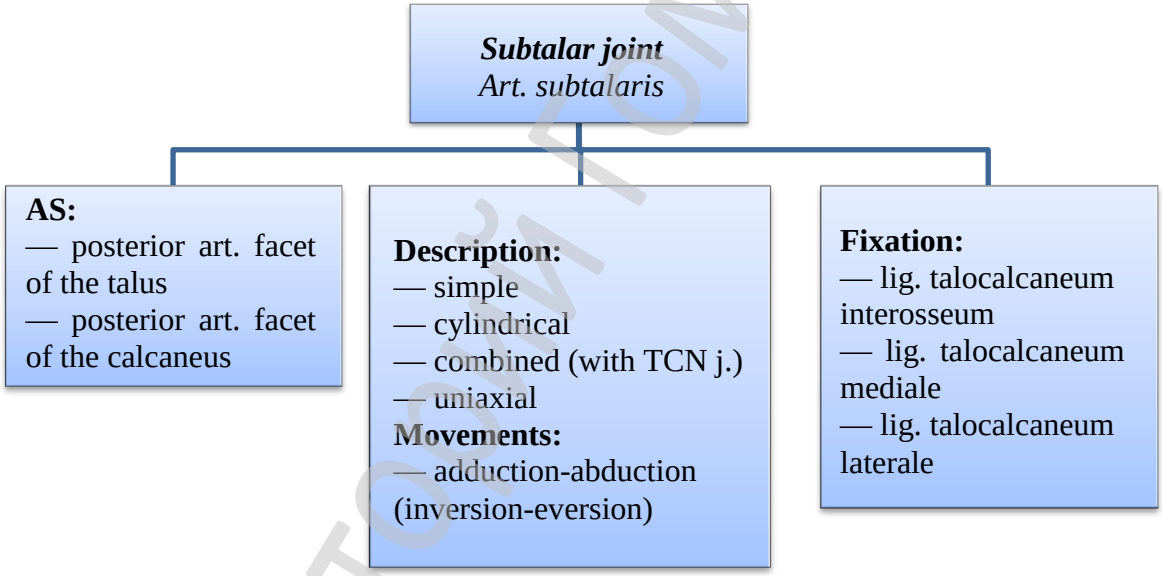

Figure 13.13 — Subtalar joint

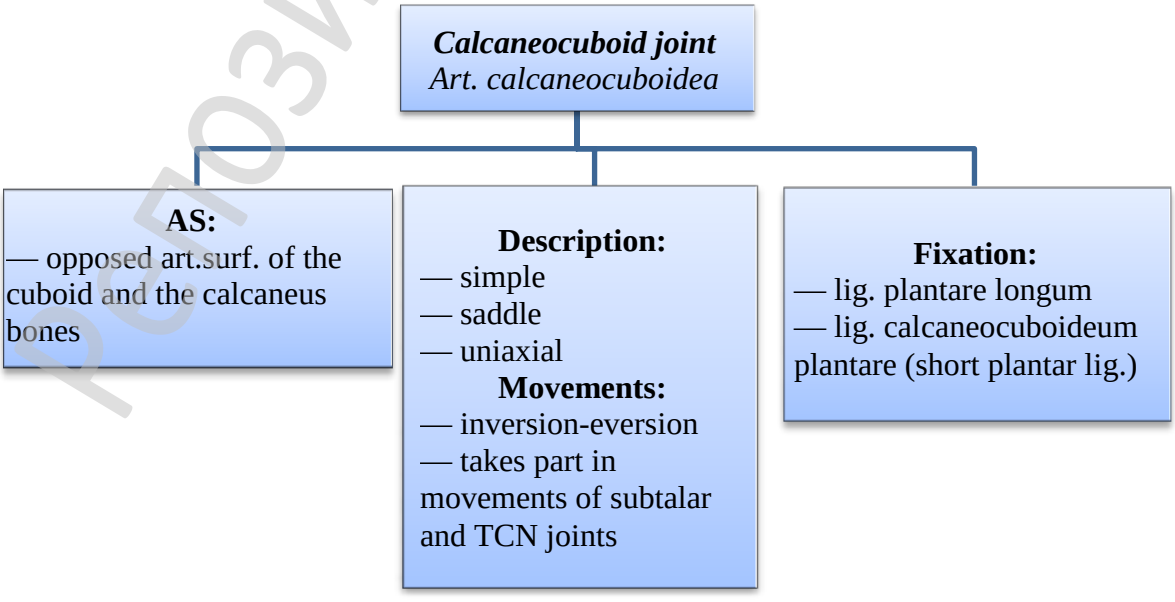

Figure 13.14 — Calcaneocuboid joint

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The long plantar ligament (*lig. plantare longum*) passes from calcaneus and its tubercle, to the ridge and tuberosity of cuboid bone. Together with the groove on the plantar surface of the cuboid (*sulcus tendinis musculi peronei longi*), it makes a tunnel for the tendon of the fibularis longus muscle. It is the most powerful factor limiting depression of the lateral longitudinal arch.

The plantar calcaneocuboid ligaments *(lig. calcaneocuboideum plantare)* is a short plantar ligament. It passes from calcaneal tubercle to cuboid bone. It sustains the lateral longitudinal arch.

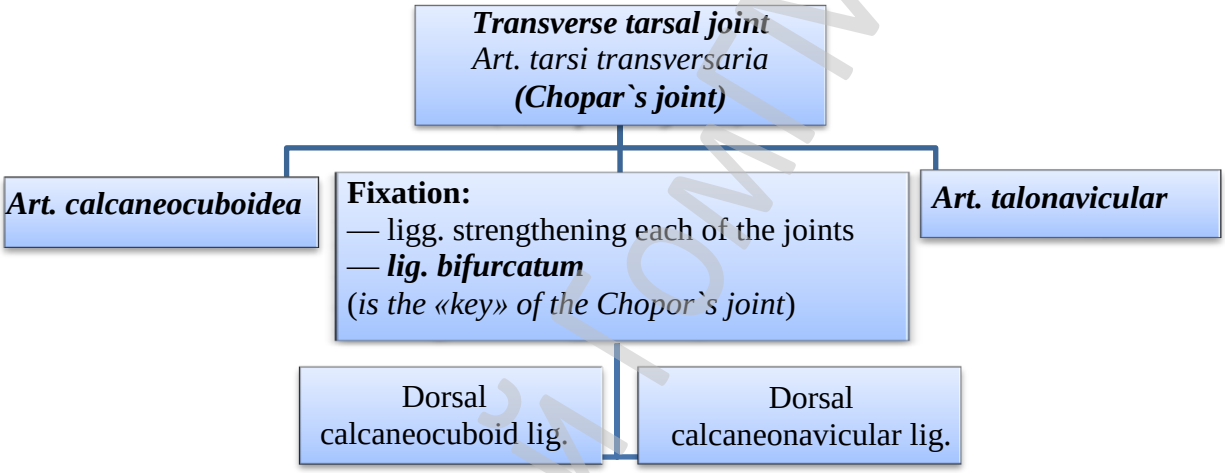

Figure 13.15 — Transverse tarsal joint

The bifurcate ligament (lig. bifurcatum):

• ***The calcaneonavicular ligament*** *(lig. calcaneonaviculare)* from calcaneus to the posterolateral border of navicular bone;

• ***The calcaneocuboid ligament*** *(lig. calcaneocuboidea)* from calcaneus to the dorsal surface of cuboid bone.

This ligament is the *«key»toChopar's joint. S*ince only when this ligament has been cut the articular surfaces be drawn widely apart.

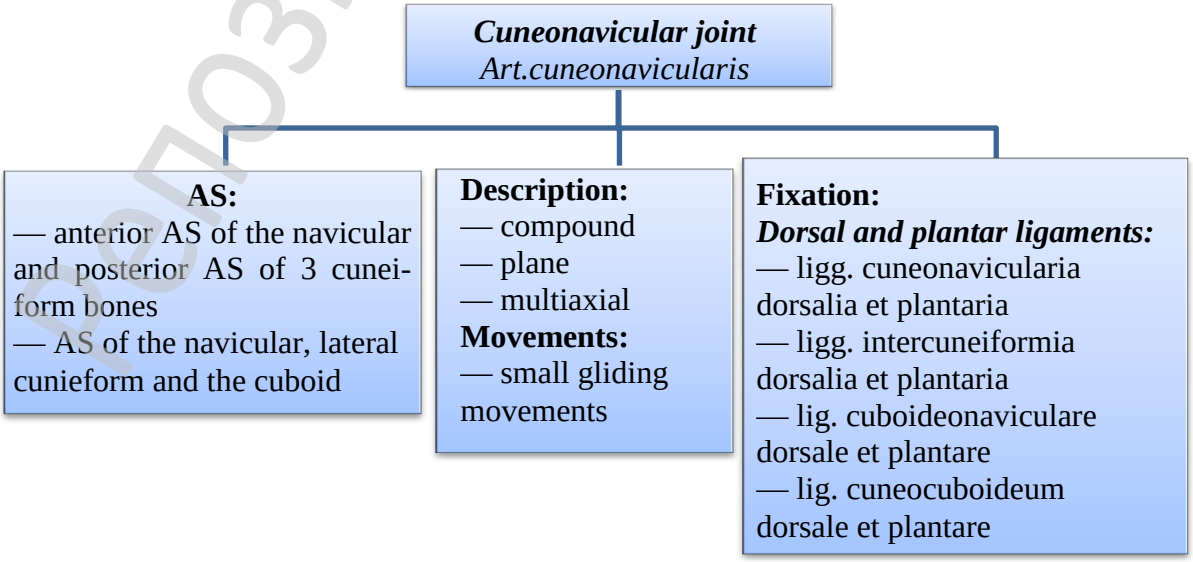

Figure 13.16 — Cuneonavicular joint

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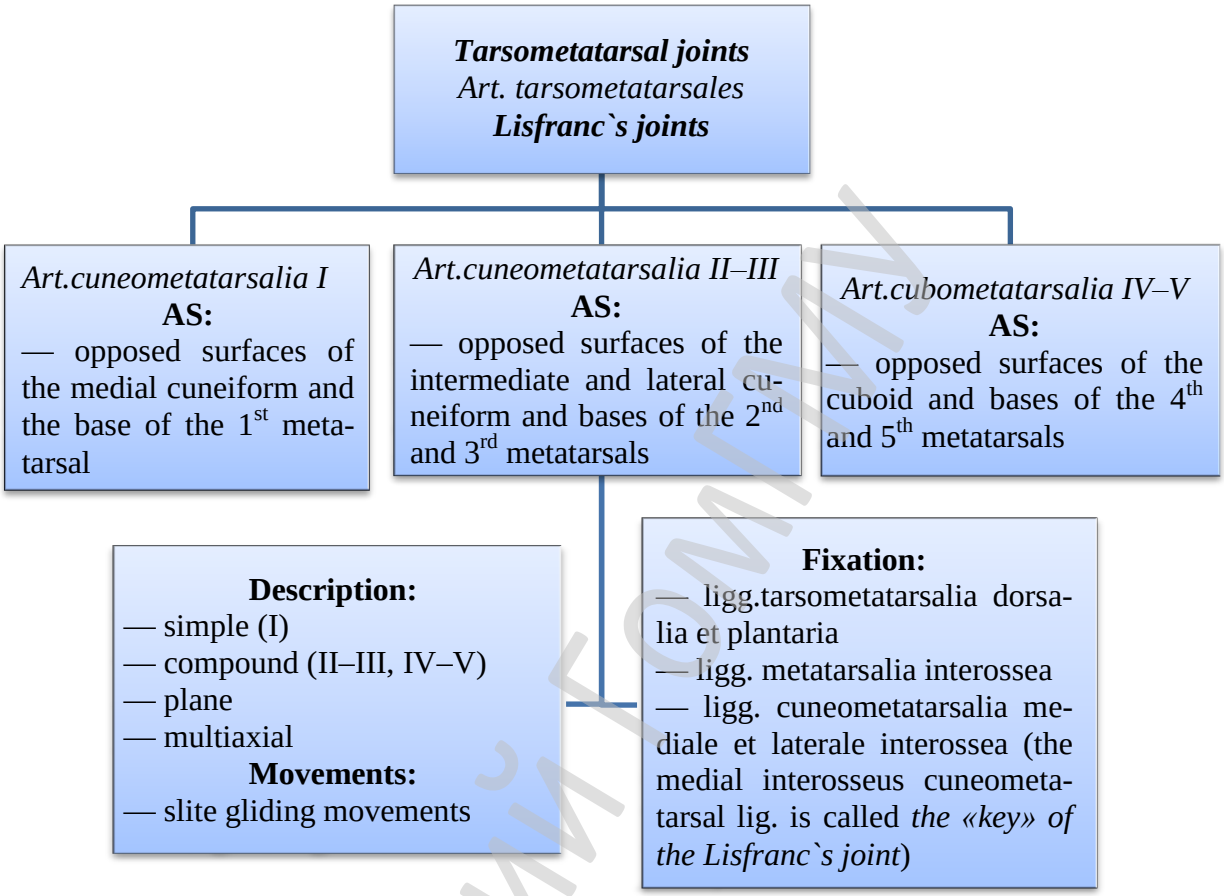

Figure 13.17 — Tarsometatarsal joints

The **cuneometatarsal interosseous ligament** (*ligg. cuneometatarsalia interossea*) is located between the medial cuneiform bone and the second metatarsal bone and it is called *the «key» of Lisfranc's joint*. Transection across the tarsometatarsal joint (cut of the «key») is a standard method for surgical amputation of the distal part of the foot.

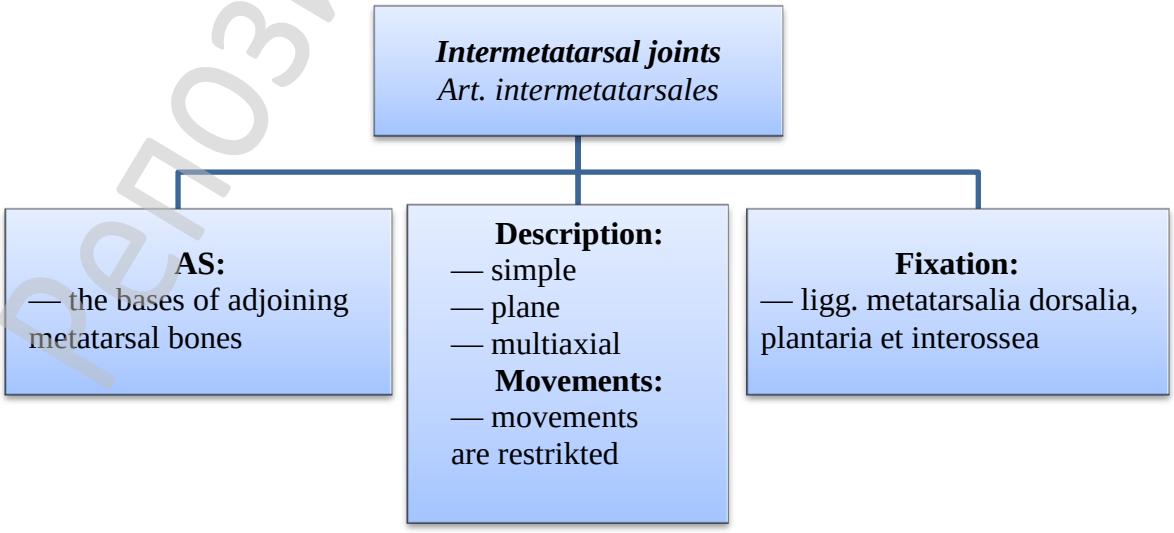

Figure 13.18 — Intermetatarsal joints

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The plantar and dorsal metatarsal ligaments *(ligg. metatarslia plantaria et dorsalia)* the plantar are stronger than dorsal.

The interosseous metatarsal ligaments *(ligg. metatarslia interossea)* are intracapsular ligaments.

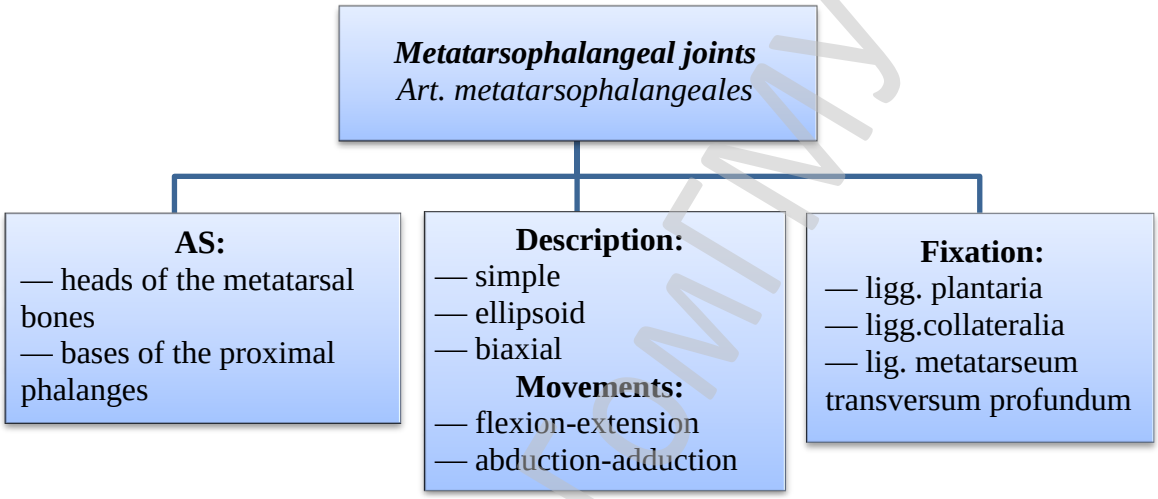

Figure 13.19 — Metatarsophalangeal joints

The plantar ligaments *(ligg. plantaria)* are thick and located in the space between collateral ligaments on plantar surface.

The collateral ligaments *(ligg. collateralia)* are strong and located on either side of each joint.

The deep transverse metatarsal ligament *(lig. metatarsale transversum profundum)* passes between the heads of the metatarsals on the plantar surface.

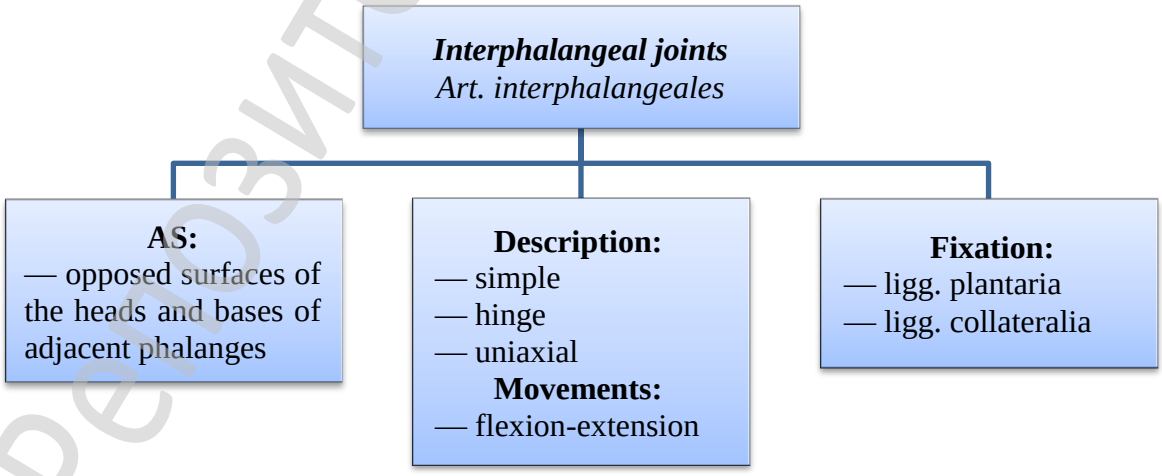

Figure 13.20 — Interphalangeal joints

The plantar ligaments *(ligg. plantaria)* are thick and located in the space between collateral ligaments on plantar surface.

The collateral ligaments *(ligg. collateralia)* are strong and located on either side of each joint.

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14. THE ARCHES OF THE FOOT

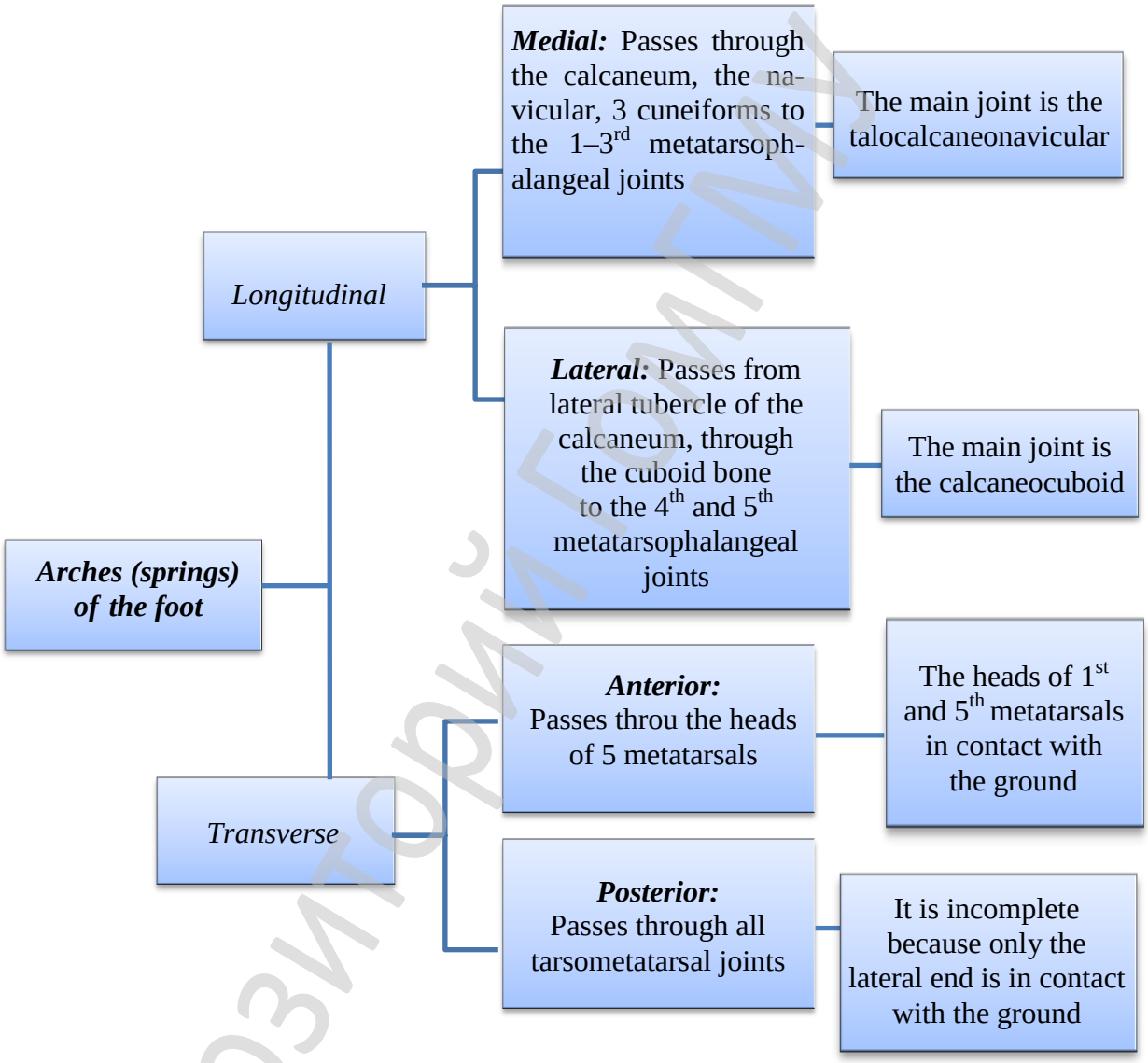

Figure 14.1 — Arches of the foot

Arches of the foot help in fast walking, running and jumping, it also helps in weight-bearing and in providing upright posture. Arches are supported by intrinsic and extrinsic muscles of the sole in addition to ligaments. The presence of the foot arches make the sole concave. There are two groups of arches: longitudinal (medial and lateral) and transverse (anterior and posterior).

The factors affecting on arches shape are:

1. Shape of the bones forming the arches.
2. Intersegmental ties are ligaments and muscles that hold the different segments of the arch.

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3. Tie beams are structures that connect the two ends of the arch preventing it from flattening.

4. Slings are the muscles that intend to keep the summit of the arch pulled up.

5. Suspension is provided by muscles suspending the medial and lateral longitudinal arches.

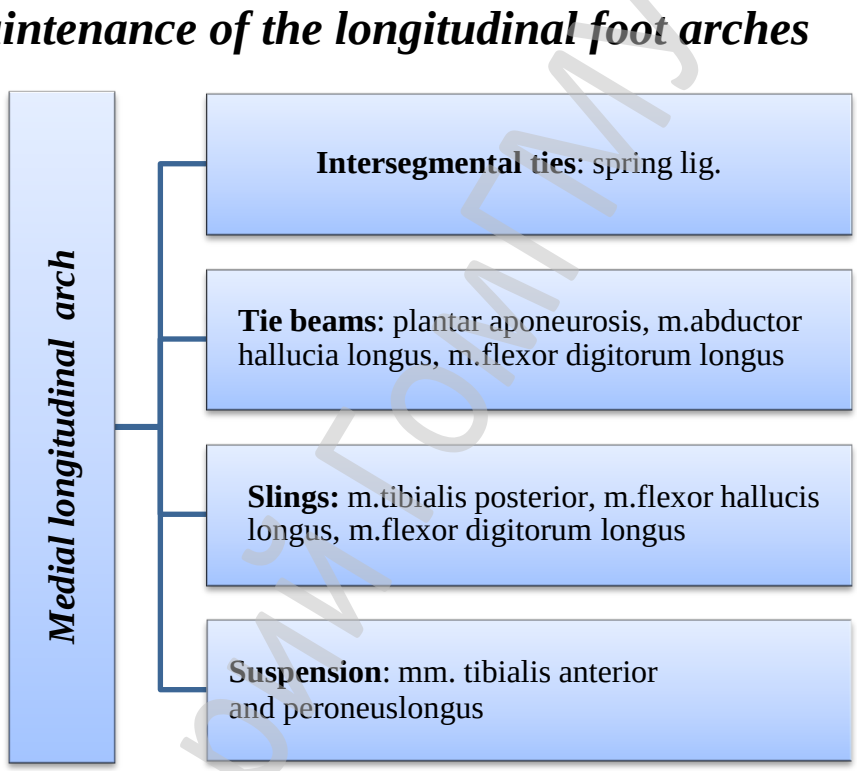

Figure 14.2 — Medial longitudinal arch

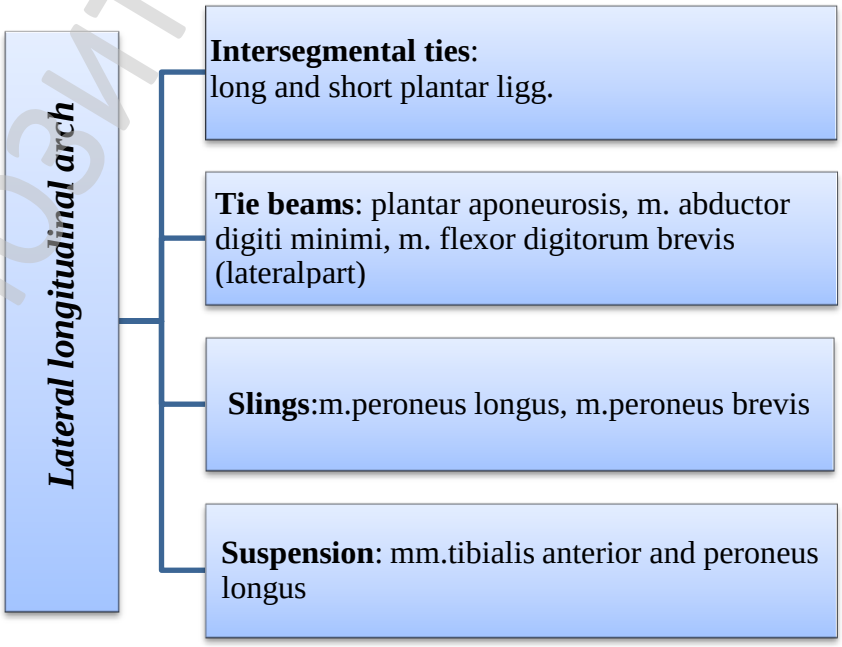

Figure 14.3 — Lateral longitudinal arch

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Strengthening of the transverse foot arches

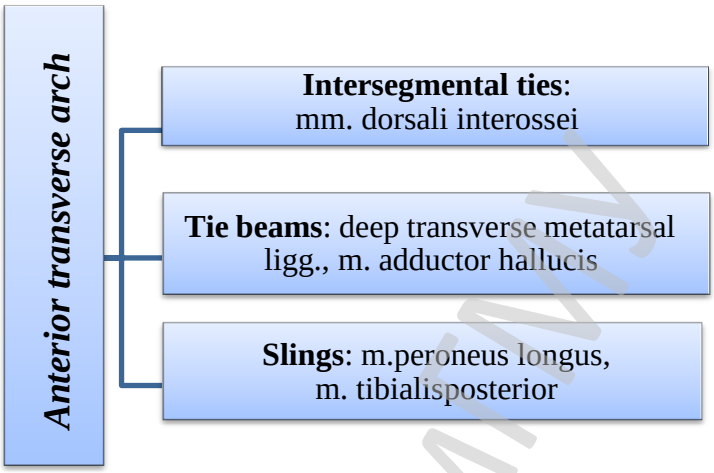

Figure 14.4 — Anterior transverse arch

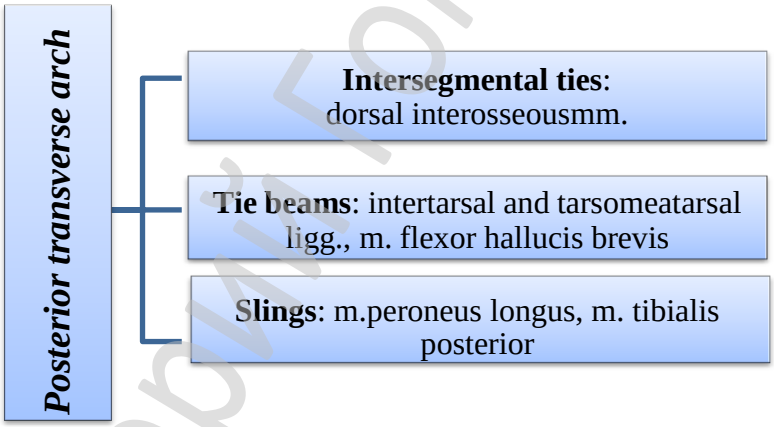

Figure 14.5 — Posterior transverse arch

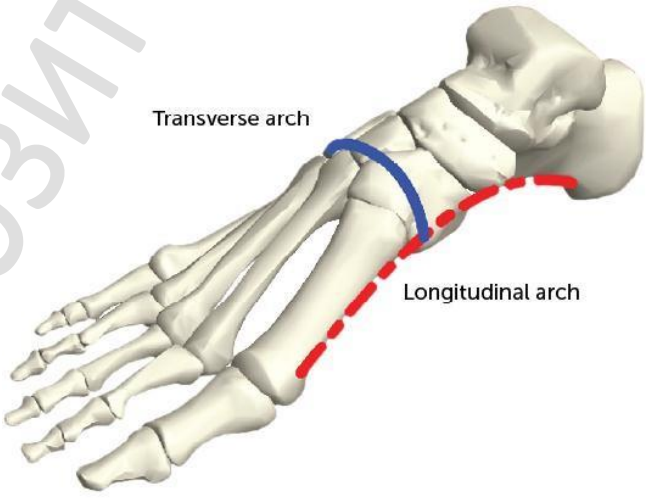

Figure 14.6 — The foot arches

The human foots are arch shaped due to increased load by the upright position of the body. Their shape allows them to act as a **spring**, bearing the weight of the body and absorbing the shock produced during walking. The flexibility conferred to the foot by these arches facilitates functions such as walking and running.

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15. SPECIAL JOINTS

In a human organism there are some joints not related with the loco motor system. These joints are found within the larynx and middle ear.

The joints of larynx are involved into the process of voice production. The joints connect neighboring cartilages of larynx and during their movement change the tension of vocal cords.

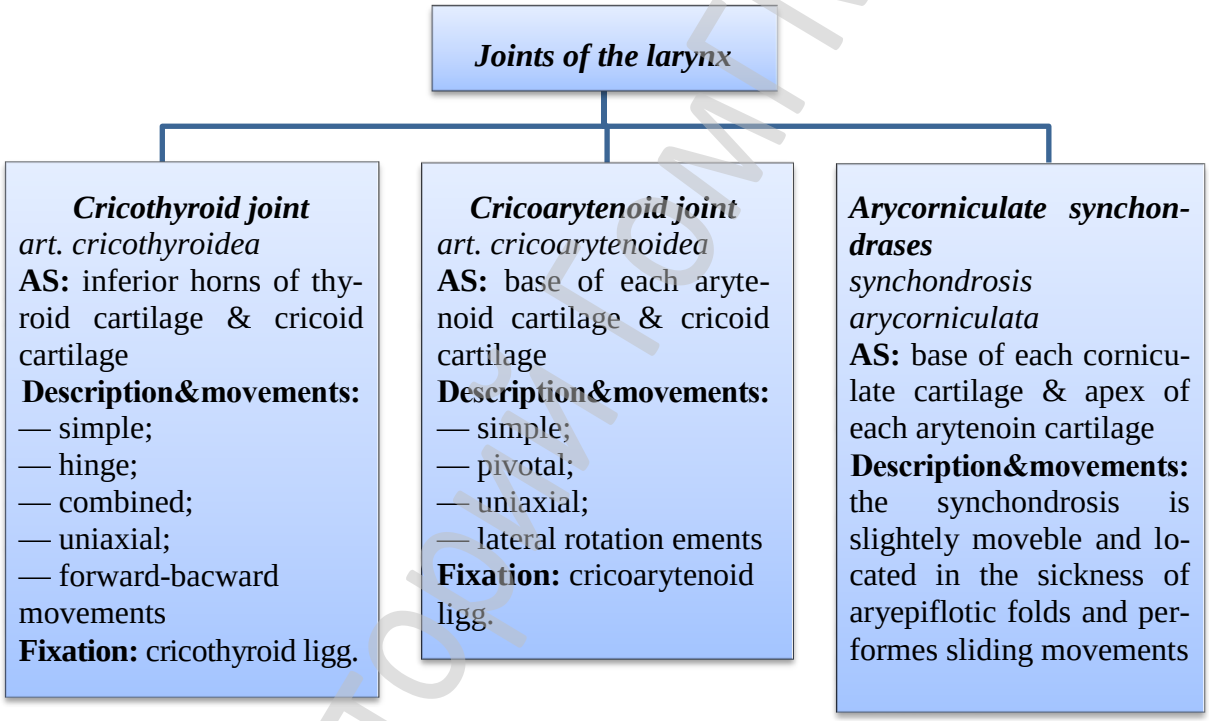
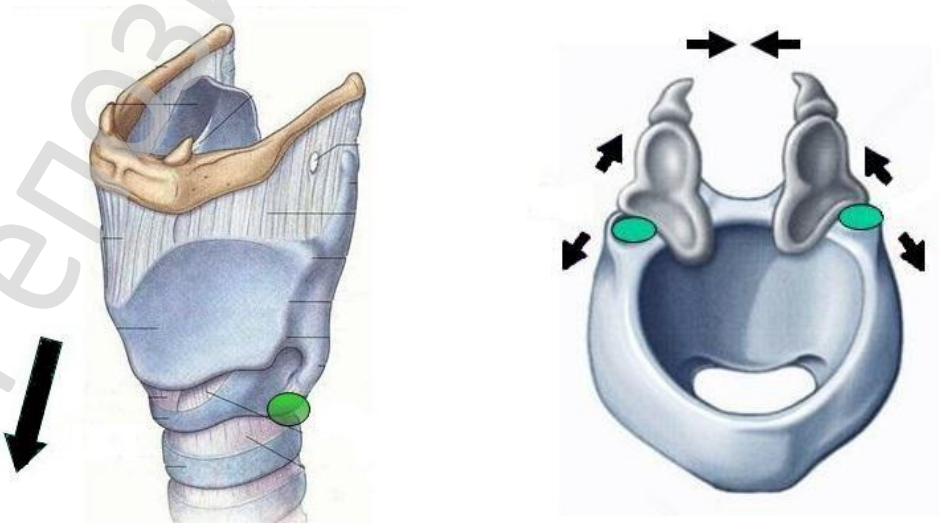


Figure 15.1 — Joints of the larynx



a **b**

Figure 15.2 — Larynx: a — cricothyroid joint; b — cricoarytenoid joint

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The joints of the middle ear are located in places where the auditory ossicles articulate (malleus, incus and stapes) with one another. These jointas are of limited mobility and performe functions of sound conduction and mechanical transmission of sound vibrations. The auditory ossicles form a mobile chain running across the tympanic cavity, from the tympanic membrane to the labyrinth. The mobility of the ossicles becomes reduced from malleus to stapes and intensivity of harsh sounds and excessive concussions decreses whil reching the organ of Corti.

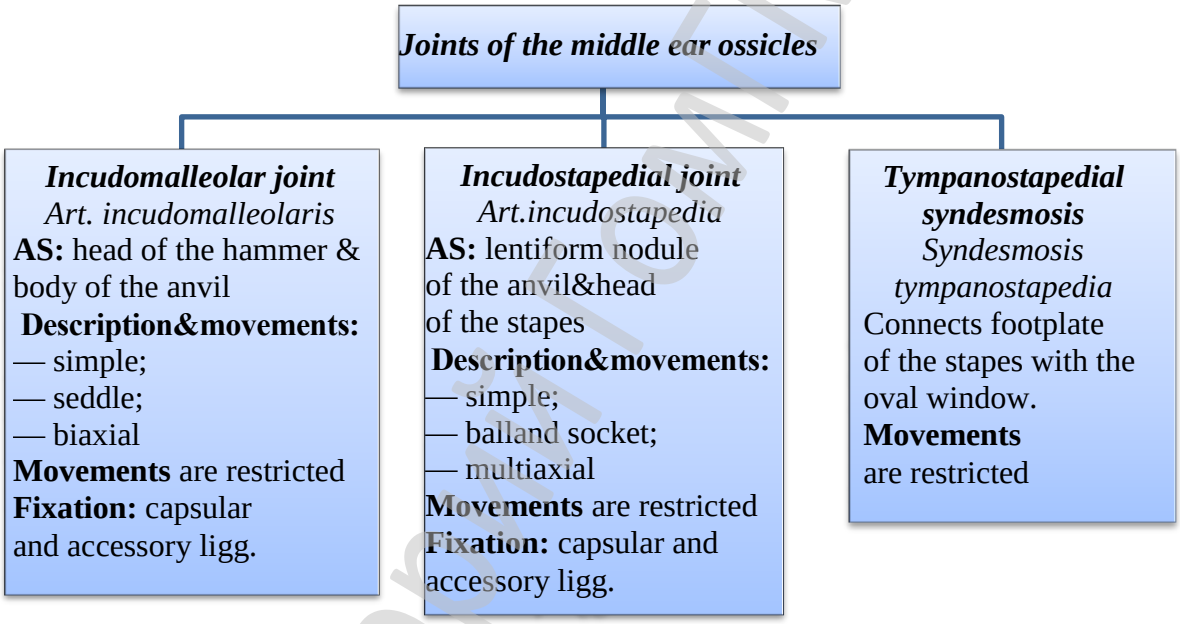

Figure 15.3 — Joints of the middle ear

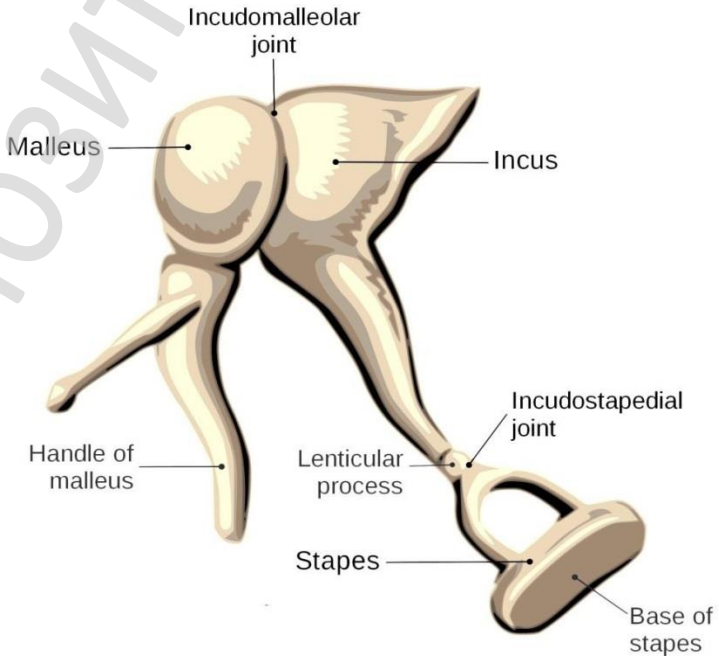

Figure 15.4 — Auditory ossicles connections

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MULTIPLE CHOICE QUESTIONS. PART 1

Choose one or more correct answers

1. Anatomical position includes:
Variants of answer:
a) person stands erect;
b) palms turned forward;
c) palms facing the body;
d) limbs at side of body;
e) limbs raised up.

2. What parts does the frontal plane divide the body into?
Variants of answer:
a) superior;
b) inferior;
c) anterior;
d) posterior;
e) left and right.

3. What parts does the sagittal plane divide the body into?
Variants of answer:
a) superior;
b) inferior;
c) anterior;
d) posterior;
e) left and right.

4. What parts does the transverse plane divide the body into?
Variants of answer:
a) superior;
b) inferior;
c) anterior;
d) posterior;
e) left and right.

5. List the movements around the vertical axis:
Variants of answer:
a) flexion;
b) abduction;

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c) extension;
d) circumduction;
e) rotation.

6. List the movements around the sagittal axis:
Variants of answer:
a) flexion;
b) abduction;
c) extension;
d) circumduction;
e) rotation.

7. List the movements around the frontal axis:
Variants of answer:
a) flexion;
b) abduction;
c) extension;
d) circumduction;
e) rotation.

8. Synarthroses is…
Variants of answer:
a) slightly moveable joint;
b) freely moveable joint;
c) immoveable joint;
d) synovial joint;
e) symphyses.

9. Amphiarthroses is…
Variants of answer:
a) slightly moveable joint;
b) freely moveable joint;
c) immoveable joint;
d) synovial joint;
e) symphyses.

10. Diarthroses is…
Variants of answer:
a) slightly moveable joint;
b) freely moveable joint;
c) immoveable joint;
d) synovial joint;
e) symphyses.

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11. What kind of tissue connects syndesmoses?
Variants of answer:
a) bonny tissue;
b) chondral tissue;
c) fat tissue;
d) connective tissue;
e) epithelial tissue.

12. What kind of tissue connects synchondroses?
Variants of answer:
a) bonny tissue;
b) chondral tissue;
c) fat tissue;
d) connective tissue;
e) epithelial tissue.

13. What kind of tissue connects synostoses?
Variants of answer:
a) bonny tissue;
b) chondral tissue;
c) fat tissue;
d) connective tissue;
e) epithelial tissue.

14. Membrane is …
Variants of answer:
a) synostoses;
b) synchondroses;
c) syndesmoses;
d) amphiarthroses;
e) diarthroses.

15. Sutures are …
Variants of answer:
a) synostoses;
b) synchondroses;
c) syndesmoses;
d) amphiarthroses;
e) diarthroses.

16. Gomphoses is …
Variants of answer:
a) synostoses;
b) synchondroses;

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c) syndesmoses;
d) amphiarthroses;
e) diarthrosis.

17. Which of the following anatomical structures related to additional elements of the joint?

Variants of answer:
a) articular capsule;
b) articular capsule;
c) ligaments;
d) discs;
e) meniscs.

18. Simple joint is …

Variants of answer:
a) has two articular surfaces;
b) has three articular surfaces;
c) has additional elements;
d) when two anatomical joints function together;
e) has movement around 3 axis.

19. Complex joint is …

Variants of answer:
a) has two articular surfaces;
b) has three articular surfaces;
c) has additional elements;
d) when two anatomical joints function together;
e) has movement around 3 axis.

20. Compound joint is …

Variants of answer:
a) has two articular surfaces;
b) has three articular surfaces;
c) has additional elements;
d) when two anatomical joints function together;
e) has movement around 3 axis.

21. Combine joint is …

Variants of answer:
a) has two articular surfaces;
b) has three articular surfaces;
c) has additional elements;

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d) when two anatomical joints function together;
e) has movement around 3 axis.

22. Name amphiarthrosis of the skull:
Variants of answer:
a) mental symphysis;
b) temporomandibular joint;
c) atlantooccipital joint;
d) dentoalveolar joint;
e) sphenoid fontanelles.

23. Name syndesmosis of the skull:
Variants of answer:
a) mental symphysis;
b) temporomandibular joint;
c) atlantooccipital joint;
d) dentoalveolar joint;
e) sphenoid fontanelles.

24. Name diarthrosis of the skull:
Variants of answer:
a) mental symphysis;
b) temporomandibular joint;
c) atlantooccipital joint;
d) dentoalveolar joint;
e) sphenoid fontanelles.

25. Write description of the temporomandibular joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) multiaxial.

26. Write description of the atlantooccipital joint:
Variants of answer:
a) simple
b) compound
c) complex
d) combine
e) biaxial

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27. Write description of the atlantoaxial joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) biaxial.

28. When you turn (rotation) movement of the head is carried out:
Variants of answer:
a) atlantoaxial joint;
b) atlantooccipital joint;
c) occipitoaxial joint;
d) intervertebral joint;
e) condylooccipital joint.

29. When you lateral bend movement of the head is carried out:
Variants of answer:
a) atlantoaxial joint;
b) atlantooccipital joint;
c) occipitoaxial joint;
d) intervertebral joint;
e) condylooccipital joint.

30. When you bend forward movement of the head is carried out:
Variants of answer:
a) atlantoaxial joint;
b) atlantooccipital joint;
c) occipitoaxial joint;
d) intervertebral joint;
e) condylooccipital joint.

31. List the ligaments of the atlantooccipital joint:
Variants of answer:
a) alar ligaments;
b) crutiate ligament;
c) anterior atlantooccipital membrane;
d) lateral ligament;
e) posterior longitudinal ligament.

32. List the ligaments of the atlantoaxial joint:
Variants of answer:
a) alar ligaments;
b) crutiate ligament;

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c) anterior atlantooccipital membrane;
d) lateral ligament;
e) posterior longitudinal ligament.

33. Name amphiarthrosis of the spine:
Variants of answer:
a) interspinal ligament;
b) intervertebral joint;
c) atlantoaxial joint;
d) sacro-coccygeal symphysis;
e) intervertebral symphysis.

34. Name synarthrosis of the spine:
Variants of answer:
a) interspinal ligament;
b) zygopophysial joint;
c) atlantoaxial joint;
d) sacro-coccygeal symphysis;
e) intervertebral symphysis.

35. Name diarthrosis of the spine:
Variants of answer:
a) interspinal ligament;
b) zygopophysial joint;
c) atlantoaxial joint;
d) sacro-coccygeal symphysis;
e) intervertebral symphysis

36. Write description of the zygopophysial joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) multiaxial.

37. List short ligaments of the spine:
Variants of answer:
a) lig. longitudinale;
b) lig. flava;
c) lig. supraspinale;
d) lig. interspinalis;
e)lig. Intertransversaria.

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38. List long ligaments of the spine:

Variants of answer:

a) lig. longitudinale;
b) lig. flava;
c) lig. supraspinale;
d) lig. interspinalis;
e) lig. Intertransversaria.

39. Name the parts of the intervertebral disc:

Variants of answer:

a) annulus pulposus;
b) annulus fibrosus;
c) fibrosus pulposus;
d) nucleus fibrosus;
e) nucleus pulposus.

40. Which of the following bones connections do not connect the vertebrae to each other?

Variants of answer:

a) disci intervertebrales;
b) ligamenta flava;
c) articulatio costotransversaria;
d) articulationes zygapophisiales;
e) ligamenta interspinalia.

41. By synchondrosis connected bones:

Variants of answer:

a) the nasal and frontal;
b) the upper and lower jaws;
c) the right and left parietal;
d) the temporal and occipital;
e) zygomatic and upper jaw.

42. Lateral ligament of the temporomandibular joint starts at:

Variants of answer:

a) lateral plate pterygoid process;
b) medial plate of the pterygoid process;
c) zygomatic process;
d) neck of the condylar process;
e) spine of sphenoid bone.

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43. Sphenomandibular ligament starts at:
Variants of answer:
a) zygomatic arch;
b) mastoid process;
c) spine of the sphenoid bone;
d) palatine process;
e) styloid process.

44. Kyphosis formed:
Variants of answer:
a) cervical region of the spinal column;
b) thoracic region of the spinal column;
c) lumbar region of the spine column;
d) coccygeal region of the spine column;
e) no right answer.

45. Write description of the sternocostal joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) biaxial.

46. Write description of the costotransverse joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) multiaxial.

47. List the syndesmoses of the pectoral girdle:
Variants of answer:
a) acromioclavicular joint;
b) sternoclavicular joint;
c) coracoacromial ligament;
d) transversum scapula ligament;
e) acromioclavicular ligament.

48. Write description of the acromioclavicular joint:
Variants of answer:
a) simple;
b) compound;

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c) complex;
d) combine;
e) multiaxial.

49. Write description of the sternoclavicular joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) multiaxial.

50. List ligaments of the sternoclavicular joint:
Variants of answer:
a) coracoclavicular ligament;
b) costoclavicular ligament;
c) trapezoid ligament;
d) conoid ligament;
e) interclavicular ligament.

51. List ligaments of the acromioclavicular joint:
Variants of answer:
a) coracoclavicular ligament;
b) costoclavicular ligament;
c) trapezoid ligament;
d) conoid ligament;
e) interclavicular ligament.

52. Write description of the shoulder joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) multiaxial.

53. List ligaments of the elbow joint:
Variants of answer:
a) ligamentum coracohumerale;
b) lig. annulare;
c) membrana interossea;
d) lig. quadratum;
e) chorda oblique.

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54. Where is the annular ligament start?
Variants of answer:
a) medial epycondyle of the ulna;
b) lateral epycondyle of the radius;
c) radial notch of the ulna;
d) neck of the radius;
e) ulna notch of the radius.

55. Write description of the proximal radioulnar joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) multiaxial.

56. List movements of the proximal radioulnar joint:
Variants of answer:
a) flexion;
b) extension;
c) adduction;
d) abduction;
e) rotation.

57. Write description of the wrist joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) biaxial.

58. List movements of the wrist joint:
Variants of answer:
a) flexion;
b) extension;
c) adduction;
d) abduction;
e) rotation.

59. Write description of the mediocarpal joint:
Variants of answer:
a) simple;
b) compound;

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c) complex;
d) combine;
e) monoaxial.

60. Write description of the pisiform joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) multiaxial.

61. Name the articular surfaces of the pisiform joint:
Variants of answer:
a) trapezium;
b) trapezoid;
c) triquetral;
d) pisiform;
e) scaphoid.

62. Write description of the intermetacarpal joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) biaxial.

63. Write description of the metacarpophalangeal joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) biaxial.

64. List the ligaments of the metacarpophalangeal joint:
Variants of answer:
a) lig. collateralia;
b) lig. metacarpia transversa superficial;
c) lig. palmaria;
d) lig. metacarpia anterior;
e) lig. metacarpia transversa profunda.

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65. Write description of the interphalangeal joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) biaxial.

66. List the ligaments of the interphalangeal joint:
Variants of answer:
a) lig. collateralia;
b) lig. metacarpia transversa superficial;
c) lig. palmaria;
d) lig. metacarpia anterior;
e) lig. metacarpia transversa profunda.

67. What bones form the pelvis?
Variants of answer:
a) lumbar vertebra;
b) sacrum;
c) coccygium;
d) iliac bone;
e) pubic bone.

68. Name posterior wall of the greater pelvis:
a) sacrum;
b) coccyx;
c) wings of the iliac bone;
d) lumbar vertebra;
e) opened.

69. Name lateral wall of the greater pelvis:
Variants of answer:
a) sacrum;
b) coccyx;
c) wings of the iliac bone;
d) lumbar vertebra;
e) opened.

70. Name anterior wall of the greater pelvis:
Variants of answer:
a) sacrum;
b) coccyx;

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c) wings of the iliac bone;
d) lumbar vertebra;
e) opened.

71. Name posterior wall of the lesser pelvis:
Variants of answer:
a) sacrum;
b) coccyx;
c) wings of the iliac bone;
d) pubic bones;
e) opened.

72. Name anterior wall of the lesser pelvis:
Variants of answer:
a) sacrum;
b) coccyx;
c) wings of the iliac bone;
d) pubic bones;
e) opened.

73. Name posterior border of the pelvic inlet:
Variants of answer:
a) coccyx;
b) pectin pubis;
c) arcuate line;
d) pubic symphysis;
e) promontorium.

74. Name lateral border of the pelvic inlet:
Variants of answer:
a) coccyx;
b) pectin pubis;
c) arcuate line;
d) pubic symphysis;
e) promontorium.

75. Name anterior border of the pelvic inlet:
Variants of answer:
a) coccyx;
b) pectin pubis;
c) arcuate line;
d) pubic symphysis;
e) promontorium.

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76. Name posterior border of the pelvic outlet:
Variants of answer:
a) coccyx;
b) ramus of the pubis;
c) arcuate line;
d) pubic symphysis;
e) ramus of the ishium.

77. Name lateral border of the pelvic outlet:
Variants of answer:
a) coccyx;
b) ramus of the pubis;
c) arcuate line;
d) pubic symphysis;
e) ramus of the ishium.

78. Name anterior border of the pelvic outlet:
Variants of answer:
a) coccyx;
b) ramus of the pubis;
c) arcuate line;
d) pubic symphysis;
e) ramus of the ishium.

79. What is the diameter recta of the pelvic inlet (lesser pelvis)?
Variants of answer:
a) 9 cm;
b) 10,2 cm;
c) 11,2 cm;
d) 12 cm;
e) 13 cm.

80. What is the diameter transversa of the pelvic inlet (lesser pelvis)?
Variants of answer:
a) 9 cm;
b) 10,2 cm;
c) 11,2 cm;
d) 12 cm;
e) 13 cm.

81. What is the diameter obliqua of the pelvic inlet (lesser pelvis)?
Variants of answer:
a) 9 cm;
b) 10,2 cm;

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c) 11,2 cm;
d) 12 cm;
e) 13 cm.

82. What is the diameter transversa of the pelvic outlet (lesser pelvis)?
Variants of answer:
a) 9 cm;
b) 10 cm;
c) 11 cm;
d) 12 cm;
e) 13 cm.

83. What is the diameter recta of the pelvic outlet (lesser pelvis)?
Variants of answer:
a) 9–11 cm;
b) 10–12 cm;
c) 11 cm;
d) 12 cm;
e) 13 cm.

84. What is the distantia interspinarum of the greater pelvis?
Variants of answer:
a)11–15 cm
b)15–18 cm
c)20–21 cm
d)25–27 cm
e)27–29 cm

85. What is the distantia intercristarum of the greater pelvis?
Variants of answer:
a) 11–15 cm;
b) 15–18 cm;
c) 20–21 cm;
d) 25–27 cm;
e) 27–29 cm.

86. What is the distantia intertrochantrica of the greater pelvis?
Variants of answer:
a) 15–18 cm;
b) 20–25 cm;
c) 25–27 cm;
d) 27–29 cm;
e) 30–32 cm.

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87. What is the external anteroposterior diameter of the greater pelvis?
Variants of answer:
a) 11–15 cm;
b) 15–18 cm;
c) 20–21 cm;
d) 25–27 cm;
e) 27–29 cm.

88. Name the syndesmoses of pelvic girdle:
Variants of answer:
a) lig. sacrotuberale;
b) lig. sacrospinale;
c) lig. sacrococcygeum;
d) lig. inguinale;
e) membrana obturaturia.

89. Where is the sacrotuberous ligament start?
Variants of answer:
a) lateral surface of sacrum;
b) coccyx;
c) pubic bone;
d) ishiadic tuber;
e) ischiadic ramus.

90. Name the amphiarthrosis of pelvic girdle:
Variants of answer:
a) sacroiliac joint;
b) sacrotuberal ligament;
c) sacrotuberal joint;
d) pubic symphysis;
e) membrana obturatoria.

91. Name the diarthrosis of pelvic girdle:
Variants of answer:
a) sacroiliac joint;
b) sacrotuberal ligament;
c) sacrotuberal joint;
d) pubic symphysis;
e) membrana obturatoria.

92. What ligament is involved in the formation of a greater sciatic foramen?
Variants of answer:
a) lig. sacrotuberale;
b) lig. sacrospinale;

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c) lig. sacrococcygeum;
d) lig. inguinale;
e) membrana obturaturia.

93. What passes through the greater sciatic foramen?
Variants of answer:
a) obturator internus muscle;
b) piriformis muscle;
c) pudental vessels;
d) sciatic nerve;
e) pudental nerves.

94. What passes through the lesser sciatic foramen?
Variants of answer:
a) obturator internus muscle;
b) piriformis muscle;
c) pudental vessels;
d) sciatic nerve;
e) pudental nerves.

95. Write description of the sacroiliac joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) multiaxial.

96. List ligaments of the sacroiliac joint:
Variants of answer:
a) lig. annulare;
b) lig. sacroiliacum posterius;
c) lig. inguinale;
d) lig. iliolumbale;
e) lig. arcuatum pubis.

97. List movements of the sacroiliac joint:
Variants of answer:
a) flexion;
b) extension;
c) adduction;
d) immoveable;
e) abduction.

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98. List ligaments of the pubic symphysis:
Variants of answer:
a) lig. annulare;
b) lig. pubicum superius;
c) lig. inguinale;
d) lig. iliolumbale;
e) lig. arcuatum pubis.

99. Under what conditions can relax ligaments of the pubic symphysis?
Variants of answer:
a) durng training;
b) during jumping;
c) during pregnancy;
d) during dancing;
e) not relax.

100. Name the syndesmoses of the free lower limb:
Variants of answer:
a) hip;
b) knee;
c) tibiofibularis;
d) ankle;
e) foot.

101. Write description of the hip joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) multiaxial.

102. List intraarticular ligaments of the hip joint:
Variants of answer:
a) lig. transversum acetabuli;
b) lig. capitis femoris;
c) lig. zona orbicularis;
d) lig. iliofemorale;
e) lig. pubofemorale.

103. List extraarticular ligaments of the hip joint:
Variants of answer:
a) lig. transversum acetabuli;
b) lig. capitis femoris;

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c) lig. zona orbicularis;
d) lig. iliofemorale;
e) lig. pubofemorale.

104. List intracapsule ligaments of the hip joint:
Variants of answer:
a) lig. transversum acetabuli;
b) lig. capitis femoris;
c) lig. zona orbicularis;
d) lig. iliofemorale;
e) lig. pubofemorale.

105. Which ligament passes from the anterior inferior iliac spine to the inyertrochanteric line of the femur?
Variants of answer:
a) lig. transversum acetabuli;
b) lig. capitis femoris;
c) lig. zona orbicularis;
d) lig. iliofemorale;
e) lig. pubofemorale.

106. What factors increase the stability of the hip joint?
Variants of answer:
a) the acetabulum is deep and encompasses nearly all of the head of the femur;
b) the iliofemoral, pubofemoral and ischiofemoral ligaments are very strong and along with the thickened joint capsule, provide a large degree of stability;
c) anteriorly, where the ligaments are strongest, the medial flexors (located anteriorly) are fewer and weaker;
d) posteriorly, where the ligaments are weakest, the medial rotators are greater in number and stronger — they effectively «pull» the head of the femur into the acetabulum;
e) the acetabular labrum is increase in depth provides a larger articular surface, further improving the stability of the joint

107. List movements of the hip joint:
Variants of answer:
a) flexion;
b) extension;
c) adduction;
d) rotation;
e) circumduction.

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108. Write description of the knee joint:

Variants of answer:

a) simple;
b) compound;
c) complex;
d) combine;
e) multiaxial.

109. List intraarticular ligaments of the knee joint:

Variants of answer:

a) lig. cruciatum;
b) lig. transversum genus;
c) lig. collaterale fibulare;
d) lig. patellae;
e) lig. meniscofemorale.

110. List extraarticular ligaments of the hip joint:

Variants of answer:

a) lig. cruciatum;
b) lig. transversum genus;
c) lig. collaterale fibulare;
d) lig. patellae;
e) lig. meniscofemorale.

111. What movements occur in the knee joint?

Variants of answer:

a) flexion;
b) extension;
c) adduction;
d) rotation;
e) circumduction.

112. What is the name of the ligament that connects the anterior ends of the menisci?

Variants of answer:

a) lig. cruciatum;
b) lig. transversum genus;
c) lig. collaterale fibulare;
d) lig. patellae;
e) lig. meniscofemorale.

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113. What is the name of the ligament that connects the epicondyle of the femur and the head of the fibula?

Variants of answer:

a) lig. cruciatum;
b) lig. transversum genus;
c) lig. collaterale fibulare;
d) lig. collaterale fibulare;
e) lig. meniscofemorale.

114. What is the name of the ligament that connects the head of the fibula and intercondylar area of the tibia?

Variants of answer:

a) lig. cruciatum posterior;
b) lig. transversum genus;
c) lig. popliteum obliquum;
d) lig. collaterale tibiale;
e) lig. popliteum arcuatum.

115. What ligaments hold the patella in the correct position when the joint moves?

Variants of answer:

a) lig. transversum genus;
b) lig. popliteum arcuatum;
c) lateral and medial retinaculums;
d) lig. collaterale fibulare;
e) lig. collaterale tibiale.

116. Which inner ligaments provide anteroposterior stability?

Variants of answer:

a) lig. popliteum arcuatum;
b) lig. collaterale fibulare;
c) lig. collaterale tibiale;
d) lig. cruciatum anterius;
e) lig. cruciatum posterius.

117. List the ligaments of the syndesmosis tibiofibularis:

Variants of answer:

a) lig. capitis fibulae anterius;
b) lig. capitis fibulae posterius;
c) lig. collateralis tibiofibulare;
d) lig. tibiofibulare anterius;
e) lig. tibiofibulare posterius.

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118. List the ligaments of the diarthrosis tibiofibularis:
Variants of answer:
a) lig. capitis fibulae anterius;
b) lig. capitis fibulae posterius;
c) lig. collateralis tibiofibulare;
d) lig. tibiofibulare anterius;
e) lig. tibiofibulare posterius.

119. Write description of the tibiofibular joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) multiaxial.

120. What movements occur in the tibiofibular joint?
Variants of answer:
a) flexion;
b) extension;
c) adduction;
d) rotation;
e) restricted.

121. Write description of the ankle joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) multiaxial.

122. List the ligaments of the ankle joint:
Variants of answer:
a) lig. laterale;
b) lig. capitis fibulae;
c) lig. deltoideus;
d) lig. tibiofibulare anterius;
e) lig. tibiofibulare posterius.

123. What movements occur in the ankle joint?
Variants of answer:
a) flexion;
b) extension;

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c) adduction;
d) rotation;
e) restricted.

124. Name the parts of the medial ligament:
Variants of answer:
a) lig. tibiofibulare;
b) lig. calcaneofibulare;
c) lig. talofibulare;
d) lig. tibionavicularis;
e) lig. tibiotalaris.

125. Name the parts of the lateral ligament:
Variants of answer:
a) lig. tibiofibulare;
b) lig. calcaneofibulare;
c) lig. talofibulare;
d) lig. tibionavicularis;
e) lig. tibiotalaris.

126. What are the articular surfaces formed the ankle joint?
Variants of answer:
a) the condyles of the femour;
b) the condyles of the tibia4
c) the medial ankle and medial malleolar surface of the talus;
d) the lateral ankle and lateral malleolar faset of the talus;
e) the inferior AS of the tibia and superior AS of the talus.

127. Write description of the talocalcaneonavicular joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) multiaxial.

128. List the ligaments of the talocalcaneonavicular joint?
Variants of answer:
a) lig. talonaviculare;
b) lig. calcaneonaviculare plantare;
c) lig. calcaneonaviculare dorsale;
d) lig. collaterale laterale;
e) lig. talocalcaneum interosseum.

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129. What movements occur in the talocalcaneonavicular joint?
Variants of answer:
a) flexion;
b) extension;
c) adduction;
d) rotation;
e) restricted.

130. Name the articular surfaces forming the subtalar joint:
Variants of answer:
a) posterior art. facet of the talus;
b) posterior art. facet of the navicula and the head of the talus;
c) posterior art. facet of the calcaneus;
d) sustentaculum tali of the calcaneus and anterior art. facet of the talus;
e) patella.

131. Write description of the subtalar joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) uniaxial.

132. What movements occur in the subtalar joint?
Variants of answer:
a) flexion;
b) abduction;
c) adduction;
d) rotation;
e) restricted.

133. What ligaments are fixed calcaneocuboid joint?
Variants of answer:
a) lig. talocalcaneum mediale;
b) lig. talocalcaneum laterale;
c) lig.talonaviculare;
d) lig. plantare longum;
e) lig. calcaneocuboideum plantare.

134. What joints is formed the Chopar's joint?
Variants of answer:
a) art. talonavicular;
b) art. talocalcaneonavicularis;

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c) art. subtalaris;
d) art. calcaneocuboidea;
e) art. cuneonavicularis.

135. Which ligament is formed the key to Chopar's joint?
Variants of answer:
a) lig. calcaneonaviculare plantare;
b) lig. calcaneonavicule dorsale;
c) lig. collaterale laterale;
d) lig. calcaneonaviculare;
e) lig. calcaneocuboidea.

136. What joints is formed the Lisfranc's joint?
Variants of answer:
a) art. Talonavicular;
b) art. Talocalcaneonavicularis;
c) art. Tarsometatarsales;
d) art. Calcaneocuboidea.

137. Which ligament is formed the key to Lisfranc's joint?
Variants of answer:
a) ligg. cuneometatarsalia interossea;
b) ligg. cuneonavicularia dorsalia et plantaria;
c) ligg. intercuneiformia dorsalia et plantaria;
d) lig. cuboideonaviculare dorsale et plantare;
e) lig. cuneocuboideum dorsale et plantare.

138. Where is located the key to Lisfranc's joint?
Variants of answer:
a) between lateral cuneiform bone and the 2-nd metatarsal bone;
b) between navicular bone and the 2-nd metatarsal bone;
c) between medial cuneiform bone and the 3-nd metatarsal bone;
d) between medial cuneiform bone and the 2-nd metatarsal bone;
e) between median cuneiform bone and the 1-nd metatarsal bone.

139. Write description of the tarsometatarsal joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) multiaxial.

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140. What movements occur in the tarsometatarsal joint?
Variants of answer:
a) flexion;
b) extension;
c) slite gliding;
d) rotation;
e) restricted.

141. What ligaments are fixed the tarsometatarsal joint?
Variants of answer:
a) lig. tarsometatarsalia;
b) lig. metatarsalia interossea;
c) lig.cuneometatarsalia;
d) lig. bifurcatum;
e) lig. metatarsalia plantare.

142. Write description of the intermetatarsal joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) multiaxial.

143. What ligaments are fixed the intermetatarsal joint?
Variants of answer:
a) lig. tarsometatarsalia;
b) lig. metatarsalia interossea;
c) lig.cuneometatarsalia;
d) lig. bifurcatum;
e) lig. metatarsalia plantare.

144. What movements occur in the intermetatarsal joint?
Variants of answer:
a) flexion;
b) extension;
c) slite gliding;
d) rotation;
e) restricted.

145. Write description of the metatarsophalangeal joint:
Variants of answer:
a) simple;
b) compound;

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c) complex;
d) biaxial;
e) multiaxial.

146. What ligaments are fixed the metatarsophalangeal joint?
Variants of answer:
a) lig. metatarsophalangeal;
b) lig. plantaria;
c) lig. metatarseum transversum;
d) lig. collateralia;
e) lig. metatarsalia plantare.

147. What movements occur in the metatarsophalangeal joint?
Variants of answer:
a) flexion;
b) extension;
c) abduction;
d) rotation;
e) restricted.

148. Write description of the interphalangeal joint:
Variants of answer:
a) simple;
b) compound;
c) complex;
d) biaxial;
e) uniaxial.

149. What ligaments are fixed the interphalangeal joint?
Variants of answer:
a) lig. metatarsophalangeal;
b) lig. plantaria;
c) lig. metatarseum transversum;
d) lig. collateralia;
e) lig. metatarsalia plantare.

150. What movements occur in the interphalangeal joint?
Variants of answer:
a) flexion;
b) extension;
c) abduction;
d) rotation;
e) restricted.

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151. Name arches of the foot:
Variants of answer:
a) saggital;
b) longitudinal;
c) frontal;
d) transverse;
e) horizontal.

152. Name parts of the longitudinal arch:
Variants of answer:
a) anterior;
b) posterior;
c) median;
d) medial;
e) lateral.

153. Name parts of the transverse arch:
Variants of answer:
a) anterior;
b) posterior;
c) median;
d) medial;
e) lateral.

154. Where does the posterior transverse arch of the foot pass?
Variants of answer:
a) through the calcaneum, navicular, cuneiforms bones;
b) through the calcaneum, cuboid bones;
c) through the heads of 5 metatarsals;
d) through all tarsometatarsal joints;
e) through the interphalangeal joints.

155. Where does the anterior transverse arch of the foot pass?
Variants of answer:
a) through the calcaneum, navicular, cuneiforms bones;
b) through the calcaneum, cuboid bones;
c) through the heads of 5 metatarsals;
d) through all tarsometatarsal joints;
e) through the interphalangeal joints.

156. Where does the medial longitudinal arch of the foot pass?
Variants of answer:
a) through the calcaneum, navicular, cuneiforms bones;
b) through the calcaneum, cuboid bones;

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c) through the heads of 5 metatarsals;
d) through all tarsometatarsal joints;
e) through the interphalangeal joints.

157. Where does the lateral longitudinal arch of the foot pass?
Variants of answer:
a) through the calcaneum, navicular, cuneiforms bones;
b) through the calcaneum, cuboid bones;
c) through the heads of 5 metatarsals;
d) through all tarsometatarsal joints;
e) through the interphalangeal joints.

158. Name the strengthening of the lateral longitudinal foot arch:
Variants of answer:
a) long and shot plantar lig.;
b) m. flexor digitorum longus;
c) m. peroneus;
d) m. tibialis anterior;
e) m. tibialis posterior.

159. Name the strengthening of the anterior transverse foot arch:
Variants of answer:
a) mm. interosseous dorsalis;
b) m. adductor hallucis;
c) m. peroneus longus;
d) m. tibialis anterior;
e) m. tibialis posterior.

160. Name the strengthening of the posterior transverse foot arch
Variants of answer:
a) mm. interosseous dorsalis;
b) m. adductor hallucis;
c) m. peroneus longus;
d) m. tibialis anterior;
e) m. tibialis posterior.

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KEYS

№ question	Correct answers	№ question	Correct answers	№ question	Correct answers	№ question	Correct answers
1	abd	41	d	81	d	121	b
2	cd	42	c	82	c	122	ac
3	e	43	c	83	a	123	ab
4	ab	44	b	84	d	124	de
5	e	45	ade	85	e	125	bc
6	b	46	ad	86	e	126	cde
7	ac	47	cd	87	c	127	bd
8	c	48	acde	88	abcde	128	abce
9	ae	49	acd	89	d	129	c
10	bd	50	be	90	d	130	ac
11	d	51	acd	91	a	131	ade
12	b	52	ace	92	a	132	bc
13	a	53	bd	93	bcde	133	de
14	c	54	c	94	ace	134	ad
15	c	55	ad	95	ade	135	de
16	c	56	e	96	bd	136	c
17	de	57	bce	97	d	137	a
18	a	58	abcd	98	be	138	d
19	c	59	be	99	c	139	abe
20	b	60	ae	100	c	140	c
21	d	61	cd	101	ace	141	abc
22	a	62	b	102	ab	142	ae
23	c	63	ae	103	de	143	be
24	b	64	ace	104	c	144	e
25	acd	65	a	105	d	145	ad
26	ade	66	ac	106	abcde	146	bcd
27	bd	67	bd	107	abcde	147	abc
28	a	68	d	108	bc	148	ae
29	b	69	c	109	abe	149	bd
30	b	70	e	110	cd	150	ab
31	c	71	ab	111	abd	151	bd
32	ab	72	d	112	b	152	de
33	de	73	e	113	c	153	ab
34	a	74	bc	114	e	154	d
35	b	75	d	115	c	155	c
36	ade	76	a	116	de	156	a
37	bde	77	e	117	de	157	b
38	ac	78	b	118	ab	158	acd
39	be	79	c	119	ae	159	abcd
40	c	80	e	120	e	160	ace

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MULTIPLE CHOICE QUESTIONS. PART 2

Choose one correct answer

1. The woman had a rupture of the pubic symphysis during childbirth. What type of connection is damaged?

Variants of answer:

a) syndesmoses;
b) synarthroses;
c) amphiarthroses;
d) diarthroses;
e) synchondroses.

2. The X-ray picture of the humerus of a 16-year-old guy in the lower third shows a transverse gap, which is not a fracture. What is this gap?

Variants of answer:

a) syndesmoses;
b) synarthroses;
c) amphiarthroses;
d) diarthroses;
e) synchondroses.

3. During a fracture of the radius, the gypsum must fix both (upper and lower radial-ulnar joints), because they are joints:

Variants of answer:

a) simple;
b) compound;
c) complex;
d) combine;
e) restricted.

4. The patient has a typical dislocation in the shoulder joint. What type of joint is the shoulder joint?

Variants of answer:

a) spheroid;
b) ball-and-socket;
c) plane;
d) pivot;
e) hinge.

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5. The guy received a hand injury with a dislocation of the metacarpophalangeal joint of the first finger. What type of joints is this joint?

Variants of answer:

a) spheroid;
b) ball-and-socket;
c) plane;
d) sadlle;
e) hinge.

6. During the injury, a rupture of the fibrous ring of the intervertebral disc took place. What type of connection does the intervertebral disc belong to?

Variants of answer:

a) syndesmoses;
b) synarthroses;
c) amphiarthroses;
d) diarthroses;
e) synostoses.

7. The patient has a dislocation in both zygopophysial joints. This happened because these joints are:

Variants of answer:

a) simple;
b) compound;
c) complex;
d) combine;
e) restricted.

8. The patient had a dislocation of the gelatinous nucleus in the spinal canal as a result of trauma. Which connection element is damaged?

Variants of answer:

a) lig. longitudinale anterius;
b) lig. longitudinale posterius;
c) ligg. interspinalia;
d) ligg. intertransversaria;
e) ligg. flava (yellow).

9. When a dens fracture of the second cervical vertebra occurs, the ligaments that fix it break. What are these ligaments?

Variants of answer:

a) lig. apicis dentis;
b) ligg. alaria;
c) lig. cruciforme atlantis;

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d) membrana tectoria;
e) lig. apicis dentis and ligg. alaria.

10. The X-ray picture of the head shows that the occipital bone consists of four regular parts. This indicates the presence of:

Variants of answer:
a) fracture;
b) temporary synchondrosis;
c) permanent synchondrosis;
d) symphysis;
e) syndesmosis.

11. The integumentary membrane protects the spinal cord from damage. What ligament is this membrane continuation of?

Variants of answer:
a) lig. longitudinale anterius;
b) lig. longitudinale posterius;
c) membrana tectoria;
d) membrana atlanto-occipitalis posterior;
e) lig.supraspinalis.

12. When surgery on the temporomandibular joint, you need to open the joint capsule. What ligament will be crossed in this case?

Variants of answer:
a) lig. mediale;
b) lig. laterale;
c) lig. sphenomandibularis;
d) lig. stylomandibularis;
e) lig. sphenoalaris.

13. As a result of an injury to the right temporomandibular joint, work in the left temporomandibular joint is also impossible. This is because these joints are:

Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) restricted.

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14. An intra-articular fracture occurred in the temporomandibular joint during an injury. The head of this joint formed by...

Variants of answer:

a) processus condylaris;
b) processus coronoideus;
c) processus styloideus;
d) processus mastoideus;
e) fossa mandibularis.

15. An intra-articular fracture occurred in the temporomandibular joint during an injury. The head of this joint formed by...

Variants of answer:

a) fossa condylaris;
b) fossa articularis;
c) fossa infratemporalis;
d) fossa temporalis;
e) fossa mandibularis.

16. What bone formation protects the head from dislocation in the temporomandibular joint?

Variants of answer:

a) colum mandibularis;
b) processus coronoideus;
c) tuberculum mandibularis;
d) caput mandibularis;
e) arcus zygomaticus.

17. On the X-ray between the body of the sternum and the xiphoid process, there is no «cartilage dimming». This led to the formation of ...

Variants of answer:

a) syndesmoses;
b) synarthroses;
c) synostoses;
d)symphysis;
e) synchondroses.

18. On the computer image of the cartilage between the body and the manubrium of the sternum, a gap is visible. This led to the transformation of cartilage into ...

Variants of answer:

a) syndesmoses;
b) synarthroses;

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c) synostoses;
d) symphysis;
e) synchondroses.

19. The fracture site passed through the joint between the bone and cartilage of the ribs during the injury. Which joint was affected?

Variants of answer:
a) art. sternocostales;
b) artt. capitis costae;
c) art. costotransversaria;
d) art. interchondrales;
e) art. costochondrales.

20. During a bone marrow puncture, a membrane is pierced from the sternum. What ligaments is it formed from?

Variants of answer:
a) ligg. sternocostalia radiata;
b) lig. capitis costae radiatum;
c) lig. costotransversarium;
d) lig. costotransversarium laterale;
e) lig. costotrasversarium superius.

21. The costal arch is a topographic reference for some internal organs. What cartilage of the ribs is it formed?

Variants of answer:
a) from 1 to 7;
b) from 1 to 12;
c) from 7 to 10;
d) from 10 to 12;
e) from 11 to 12.

22. The clavicle separated from the sternum as a result of the injury. What ligaments were affected?

Variants of answer:
a) lig. sternoclaviculare anterius;
b) ligg. sternoclaviculare posterius;
c) lig. costoclaviculare;
d) lig. interclaviculare;
e) A+B+C+D.

23. The clavicle separated from the scapula as a result of the injury. What ligaments were affected?

Variants of answer:
a) lig. acromioclaviculare;
b) lig. coracoclaviculare;

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c) lig. trapezoideum;
d) lig. conoideum;
e) A+B+C+D.

24. The sternoclavicular joint contains a disk to complement the congruence of the articular surfaces, therefore this joint is:

Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) restricted.

25. The patient has a habitual dislocation of the shoulder joint. What device is available in this joint to prevent dislocations?

Variants of answer:
a) disc;
b) meniscus;
c) labrum;
d) membrane;
e) retinaculum.

26. For surgical access to the shoulder joint, it is necessary to dissect its capsule. What ligament will be dissected?

Variants of answer:
a) lig. coracoacromeale;
b) lig. transversum scapulae superius;
c) lig. transversum scapulae inferius;
d) lig. coracohumerale;
e) lig. coracoacromeale.

27. Under normal conditions, a person is able of movement in the shoulder joint along all axes. What is the shape of the shoulder joint?

Variants of answer:
a) spheroid;
b) ball-and-socket;
c) plane;
d) sadlle;
e) hinge.

28. The surgeon needs to dissect the capsule of the elbow joint from the medial side. Which ligament needs to be cut?

Variants of answer:
a) lig. collaterale medialis;
b) lig. collaterale lateralis;

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c) lig. annulare radii;
d) lig. quadratum;
e) A+B+C+D.

29. The surgeon needs to dissect the capsule of the elbow joint from the lateral side. Which ligament needs to be cut?

Variants of answer:
a) lig. collaterale medialis;
b) lig. collaterale lateralis;
c) lig. annulare radii;
d) lig. quadratum;
e) A+B+C+D.

30. To amputate the forearm in the elbow, some ligaments must be cuted. What are these ligaments?

Variants of answer:
a) lig. collaterale medialis;
b) lig. collaterale lateralis;
c) lig. annulare radii;
d) chorda oblique;
e) A+B+D.

31. During the operation the forearm it`s necessary to cut the interosseous membrane. What are the points of its attachment?

Variants of answer:
a) margo interosseous of both bones of the forearm;
b) margo anterius of both bones of the forearm;
c) margo posterius of both bones of the forearm;
d) anterior surface of both bones of the forearm;
e) posterior surface of both bones of the forearm.

32. During a fracture of the radius, gypsum should fix both: the proximal and distal radio-ulnar joints, because they are:

Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) restricted.

33. The radius can move around a vertical axis. What ligament holds the head of this bone near the radial notch?

Variants of answer:
a) lig. collaterale medialis;
b) lig. collaterale lateralis;

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c) lig. annulare radii;
d) chorda oblique;
e) lig. quadratum.

34. The guy has gotten a hand injury with a dislocation in the metacarpophalangeal joint of the first finger during the fight. What type of joint is this:

Variants of answer:
a) spheroid;
b) ball-and-socket;
c) plane;
d) sadlle;
e) hinge.

35. The guy received a hand injury with a dislocation in the metacarpoph-alangeal joint of the third to fourth fingers. What type of joint is this:

Variants of answer:
a) spheroid;
b) ball-and-socket;
c) plane;
d) sadlle;
e) hinge.

36. To amputate the hand in the wrist joint, a number of ligaments must be cuted. What are these ligaments?

Variants of answer:
a) lig. radiocarpale dorsale;
b) lig. radiocarpale palmare;
c) lig. collateralle carpi radiale;
d) lig. collateralle carpi ulnare;
e) A+B+C+D.

37. Sometimes there is a dislocation in the wrist joint. To prevent this, there is a triangular disc between the wrist and the head of the ulna. This turns this joint into:

Variants of answer:
a) simple;
b) compound;
c) complex;
d) combine;
e) restricted.

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38. What ligament must be crossed for surgical access to the cavity of the wrist joint from the medial side?

Variants of answer:

a) lig. radiocarpale dorsale;
b) lig. radiocarpale palmare;
c) lig. collateralle carpi radiale;
d) lig. collateralle carpi ulnare;
e) A+B+C+D.

39. During surgery on the wrist joint, it is necessary to get to its cavity from the lateral side. What ligament will be crossed in this case?

Variants of answer:

a) lig. radiocarpale dorsale;
b) lig. radiocarpale palmare;
c) lig. collateralle carpi radiale;
d) lig. collateralle carpi ulnare;
e) A+B+C+D.

40. As a result of the injury, a rupture of the ligaments occurred, which is strengthened by the sacroiliac joint. What are these ligaments?

Variants of answer:

a) lig. sacroiliacum anterius;
b) lig. sacroiliacum posterius;
c) lig. sacroiliacum interosseus;
d) lig. iliolumbale;
e) A+B+C+D.

41. As a result of injury, a rupture of the pubic symphysis occurred. What ligaments were affected?

Variants of answer:

a) lig. pubicum superius;
b) lig. arcuatum pubis;
c) lig. iliopubic;
d) A+B;
e) A+C.

42. A patient has a hernia of a large sciatic foramen. What ligaments form this hole?

Variants of answer:

a) lig. sacrotuberale;
b) lig. sacrospinale;
c) lig. sacrococcygeum laterale dorsale et ventrale;
d) lig. iliopubic;
e) lig. arcuatum pubis.

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43. The obturatorian canal is formed by the obturatorian membrane. What type of articulations of the bones does the membrane belong to?

Variants of answer:

a) syndesmoses;
b) synarthroses;
c) amphiarthroses;
d) diarthroses;
e) synchondroses.

44. During a hip joint injury, a hemorrhage occurred in the joint cavity. Which ligament was damaged?

Variants of answer:

a) lig. transversum acetabuli;
b) lig. capitis femoris;
c) zona orbicularis;
d) lig. iliofemorale;
e) lig. ischifemorale.

45. To prevent dislocation in the hip joint there are special formations. What is this joint formation?

Variants of answer:

a) disc;
b) menisci;
c) labrum;
d) bursa;
e) A+C.

46. During an injury to the knee joint, a rupture of the ligament was held, which kept the menisci from diverging in different directions. What is this ligament?

Variants of answer:

a) lig. cruciatum;
b) lig. transversum genus;
c) lig. meniscofemorale;
d) retinaculum patellae;
e) lig. popliteum obliquum.

47. The articular surfaces of the knee joint are little similar to each other. What element is there to complement congruence of articular surfaces?

Variants of answer:

a) disc;
b) menisci;
c) labrum;
d) bursa;
e) B+D.

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48. During the injury, the fibula was torn from the tibia in the tibiofibular joint. What ligaments were affected?

Variants of answer:

a) lig. capitis fibulae;
b) lig. popliteum arcuatum;
c) lig. tibiofubulare anterius;
d) retinaculum patellae;
e) lig. popliteum obliquum.

49. An X-ray of the tibia of a 5-year-old guy shows a gap in the area of the tibial tuberosity that is not associated with an injury. This gap is:

Variants of answer:

a) synostosis;
b) temporary synchondrosis;
c) permanent synchondrosis;
d) symphysis;
e) syndesmosis.

50.The shin was amputated in the middle third. What prevents the divergence of the proximal ends of the fibula and tibia?

Variants of answer:

a) lig. capitis fibulae;
b) lig. popliteum arcuatum;
c) lig. tibiofubulare anterius;
d) membrana interossea;
e) lig. popliteum obliquum.

51. The patient had a separation of the patella ligament. Where is this ligament fixed on the bones of the lower leg?

Variants of answer:

a) tuberositas tibialis;
b) caput fibulae;
c) maleolus lateralis;
d) maleolus medialis;
e) linea solei.

52. The patient injured a leg in the ankle joint. On examination, a sprain on the medial side was found. What ligaments were affected?

Variants of answer:

a) lig. tibionavicularis;
b) lig. talofibulare;
c) lig. calcaneofibulare;

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d) lig. tibiocuboideus;
e) lig. deltoidea.

53. The patient had amputated feet in the Shopar joint. Which ligament is the key to this joint?

Variants of answer:
a) lig.talonaviculare;
b) lig. calcaneonaviculare;
c) lig. talocalcaneum interosseum;
d) lig. bifurcatum;
e) lig. cuneometatarsalia mediale.

54. The patient needs to amputate the foot at the Lisfranc joint. Which lig-ament is the key to this joint?

Variants of answer:
a) lig.talonaviculare;
b) lig. calcaneonaviculare;
c) lig. talocalcaneum interosseum;
d) lig. bifurcatum;
e) lig. cuneometatarsalia mediale.

55. Normally, the foot has an arches structure. What ligament keeps these arches from flattening?

Variants of answer:
a) lig.talonaviculare;
b) lig. plantare longus;
c) lig. plantaria;
d) lig. bifurcatum;
e) lig. cuneometatarsalia mediale.

56. Due to trauma, the toes straightened up in the interphalangeal joints. What ligaments are damaged?

Variants of answer:
a) ligg. plantaria;
b) ligg. collateralia;
c) lig. metatarsalia interossea;
d) lig. bifurcatum;
e) lig. metatarseum transversum profundum.

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KEYS

№ question	Correct answers	№ question	Correct answers	№ question	Correct answers	№ question	Correct answers
1	c	15	e	29	b	43	a
2	e	16	c	30	e	44	b
3	d	17	c	31	a	45	c
4	a	18	d	32	d	46	b
5	d	19	e	33	c	47	b
6	c	20	a	34	d	48	a
7	d	21	c	35	a	49	b
8	b	22	e	36	a	50	d
9	e	23	e	37	c	51	a
10	b	24	c	38	d	52	e
11	b	25	c	39	c	53	d
12	b	26	d	40	e	54	e
13	d	27	a	41	d	56	b
14	a	28	a	42	b	55	a

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Учебное издание

Горбачёва Татьяна Ивановна
Крицкая Алеся Николаевна
Жданович Виталий Николаевич

**ТИПЫ СОЕДИНЕНИЯ КОСТЕЙ:
ОПИСАНИЕ И СХЕМЫ
(на английском языке)**

Учебно-методическое пособие

Редактор ***Т. М. Кожемякина***
Компьютерная верстка ***Ж. И. Цырыкова***

Подписано в печать 23.06.2021.
Формат $60\times84^{1}/_{16}$. Бумага офсетная 80 г/м^2. Гарнитура «Таймс».
Усл. печ. л. 6,74. Уч.-изд. л. 7,37. Тираж 190 экз. Заказ № 273.

Издатель и полиграфическое исполнение:
учреждение образования «Гомельский государственный медицинский университет».
Свидетельство о государственной регистрации издателя,
изготовителя, распространителя печатных изданий № 1/46 от 03.10.2013.
ул. Ланге, 5, 246000, Гомель.

Репозиторий ГомГМУ