MUSCULOSKELETAL DISORDERS

(CHAPTERS 35 AND 36)

QUESTION 1

Describe the pathophysiology of arthritis. Distinguish between rheumatoid arthritis and osteoarthritis.

Arthritis is a general term referring to joint pain and stiffness that can be caused by any of a number of factors.

The three major forms that we'll be talking about are **rheumatoid arthritis**, **osteoarthritis**, and **gout**, but many other diseases, including infections and autoimmune diseases (lupus, scleroderma, etc.) can also cause joint problems.

Osteoarthritis, also referred to as **degenerative joint disease** (DJD,) is the most common type of arthritis and primarily affects the elderly.

It is caused by the progressive loss of the **joint cartilage** and subsequent bone remodeling due to the lack of protective cartilage within the joint.

Rheumatoid arthritis, on the other hand is **autoimmune**. It is a type III (**immune complex-mediated**) hypersensitivity.

Because of this, it tends to have flares and periods of remission, similar to other type III reactions like lupus and scleroderma.

The age of onset is significantly younger than in osteoarthritis; most cases are diagnosed between the ages of 30 and 60.

QUESTION 2

How does infectious arthritis arise?

Septic arthritis or **infectious arthritis** is caused by an infection (usually bacterial) of the joint space, commonly in large joints such as the hip or knee.

It is often an opportunistic infection, affecting the immunocompromised such as AIDS patients and those on long-term steroid therapy. It can also occur as a complication of joint replacement surgery.

QUESTION 3

What happens to the spine in ankylosing spondylitis?

Ankylosing spondylitis is technically a form of arthritis, but it is particularly rare and almost exclusively affects the intervertebral joints of the spine.

It causes the vertebrae of the spine to **fuse together**, which can result in severe **kyphosis** (hunched-forward posture.)

QUESTION 4

How can rheumatic fever affect joints?

Rheumatic fever is an inflammatory disease that can result from untreated streptococcal infections, such as strep throat. (We've talked about this before in the context of rheumatic heart disease.)

In addition to inflammation of the heart valves, rheumatic fever can also cause inflammation in the joints, which can present similarly to other forms of arthritis.

QUESTION 5

What is the pathophysiology of gout?

The symptoms of gout are caused by the deposition of **urate** crystals in the joints, due to elevated levels of **uric acid** in the blood.

Uric acid is produced during the metabolism of **purines**, a type of chemical found in high concentrations in red meat and fish.

The most common joint affected is the **1st metatarsophalangeal joint** (the base of the big toe.)

The joint usually becomes red and swollen, and in some cases **tophi** (solid nodules of urate crystals) may form that can even break through the skin.

QUESTION 6

Why do people with severe osteoporosis of the spine appear "bent over?"

Osteoporosis is a progressive decrease in the **density** of bone that often accompanies aging, particularly in women.

The best method of diagnosis is dual-energy X-ray absorptiometry (DEXA) imaging, but unfortunately this is still rather expensive.

Osteoporosis can affect the spinal curvature because the decrease in bone density leads to the **body** of the vertebrae (located in the anterior of the spinal column) becoming vertically compressed (compression fracture.)

This decrease in the height of the vertebral body causes the entire spinal column to bend forward, leading to **kyphosis**.

QUESTION 7

Compare osteoporosis and osteomalacia.

Both osteoporosis and osteomalacia fall into the category of **osteopenia**—disorders of decreased bone density. The difference is the mechanism that causes this decrease in density.

Osteoporosis is caused by an imbalance between bone formation and resorption (osteoclast & osteoblast activity.) This can often be **hormonally-driven**, and is especially common in post-menopausal women.

Osteomalacia is a **nutritional problem**, caused by a deficiency of the vitamins and minerals required for the production of bone matrix—usually vitamin D.

Risk factors include malabsorption of nutrients due to **gastric bypass surgery** as well as **lack of sun exposure**.

QUESTION 8

Describe Paget's disease of the bone.

Paget's disease is a disorder characterized by excessive, improper **bone remodeling**. It most commonly occurs in those over the age of 55.

Excessive osteoclast activity causes the **rapid breakdown** of bone matrix, which is then **replaced** with improperly formed bone.

This process results in an **excess** of bone, but this new bone is much more brittle due to lower density and more extensive vasculature.

Bones commonly affected include the pelvis, which can lead to hip fractures, and the skull, which can present as frontal bossing (bulging forehead.)

QUESTION 9

Describe muscular dystrophy.

Muscular dystrophy is a **group** of muscle diseases that result in the progressive loss of muscle tissue throughout the body.

Most forms of MD are **childhood diseases**, with Duchenne muscular dystrophy (the most common type) typically being diagnosed in toddlers.

The most common types of MD are seen almost exclusively in **boys**, although there are some forms that affect both sexes equally.

Life expectancy varies greatly between the various types of MD, ranging from normal (Becker MD) to as young as 15-45 (Duchenne MD.)

There is currently no cure for muscular dystrophy, and eventually it results in the inability to walk.

In about 30% of cases, muscular dystrophy is also accompanied by cognitive impairment, although many MD patients have normal cognitive development.

QUESTION 10

Why is it important to screen children in elementary school for scoliosis?

Scoliosis is defined as **lateral** (side-to-side) curvature of the spine, greater than 10 degrees.

For reference: excessive forward curvature of the spine is termed **kyphosis** and excessive backward curvature of the lower spine is **hyperlordosis**.

Early screening for scoliosis is important because it tends to onset at around 10-15 years old and **progresses most quickly** during puberty due to the accelerated bone growth during this time.

It is about **ten times** more common in girls than in boys.