THE MUSCULOSKELETAL SYSTEM SYSTEM-PART 2

Hello and welcome back to InterpreterPrep.com!

Welcome to our second presentation on the **Musculoskeletal System**. In part one we covered the bones and in this part we'll be going over the:

1) **JOINTS**
2) **MUSCLES**

Now before we start to talk about the joints and muscles let me say that the body is made up of **cells** and different types of cells make up the different types of **tissues**. There are 4 different types of tissues that make up our bodies:

We have:
1) **MUSCLE TISSUE**: which makes up the muscles of the body. There are **3 types of muscle**.
   We'll talk about that in a moment. Then we have
2) **NERVOUS TISSUE**: which makes up the **brain and nerves**. We also have:
3) **EPITHELIAL TISSUE**: which is the tissue that covers **organ surfaces**, like the surface of the skin, the respiratory tract and the digestive tract for example. Last but not least, we have:
4) **CONNECTIVE TISSUE**: which is a fibrous tissue that **holds the organs together** and gives them their form. Although not fibrous, the **blood** is also considered connective tissue.

Now having said this, let's define the term joint-

**JOINTS** are the **union of 2 or more bones** like for example the knee. Some joints move a lot, others barely and other joints do not move at all.

We can classify the joints by the elements that hold the bones together: for example

In a
- **SYNOVIAL JOINT** -like for example the hip joint- the parts of the bones that form the joint are covered by **cartilage**. There is a space between the bones called the **joint cavity** and we find a **synovial membrane** which secretes a thick fluid which resembles raw egg white called **synovial fluid** which lubricates the joint cavity. The bones are held in place by **ligaments** and a **capsule**. Synovial joints allow for ample movements.

- **CARTILAGINOUS JOINT** which lacks the **joint cavity**. This means that the bones are connected by cartilage which permits only limited movement like the **symphysis pubis** which allows for some separation of the hip bones during delivery.

- **FIBROUS JOINTS** which don’t allow any movement like the bones of the face and skull.

We will mention the names of a few of the larger joints:
Joints and muscles go together just like a burger and fries. The joints need the muscles to make them move.

We had mentioned that the body contains 3 types of MUSCLE. First we have:

1) **SKELETAL MUSCLE** (aka **STRIATED MUSCLE**): these are the muscles that attach themselves to the bones of the skeleton and are also the ones that bodybuilders pump iron with. They are also known as voluntary muscles since we control their movements at will.

2) **SMOOTH MUSCLE** (aka **VISCERAL MUSCLE**). These muscles are found in our internal organs (in the intestines for example) and are not under our control so they are known as the involuntary muscles.

3) **CARDIAC MUSCLE**: is a specialized type of muscle that makes up the heart. It is also involuntary muscle, very resistant to fatigue and generates its own electrical activity, in other words the heart beats on its own!

Muscles are like a rope and just as a rope is the sum of many strands, the muscles are made up of many **MUSCLE FIBERS**. The part of the muscle that attaches to the bone is called a TENDON. When a muscle contracts, the fibers shorten and movement occurs.

We will mention the names of a few of the larger muscles:

**-TRAPEZIUS**: are those muscles at the base of the neck we use to shrug our shoulders.

**-PECTORALS**: or chest muscles

**-DELTOID**: part of the shoulder where we get shots

**-BICEPS**: we all know where that one's at!

**-TRICEPS**: in the back of the upper arm

**-GLUTEUS**: muscle that form our butts!

**-QUADRICEPS**: made up of 4 different muscles is in the **front of the thigh**

**-HAMSTRING**: made up of 3 muscles is situated it the **back of the thigh**.

The arms and legs also have a network of arteries and veins (known as the vasculature) running through them. There are also nerves branching out throughout the arms and legs. The arms and legs are also known as the **EXTREMITIES**.

**SOME SIGNS OF DISEASE**

1) **JOINT PAIN (ARTHRALGIA)**

2) An injured joint can make certain noises, it may:

   - **CRACK, POP or GRIND**: there may also be problems when trying to move it, it may
   - **LOCK/CATCH**: refers to difficulty straightening out a joint.
   - **BUCKLE (GIVE WAY)**: is when a joint bends unexpectedly (typically seen in the knee)
3) **MUSCLE SPASM:** muscle spasm indicates tight, irritated muscles
4) **CRAMPING:** is a sudden and sustained, involuntary, painful muscle contraction.

**SOME ORTHOPEDIC INJURIES AND DISEASES**

1) **DISLOCATION:** is a displacement of a bone from its normal location in a joint causing a loss of function of the joint. A classic example is shoulder dislocation. Many times if recent, the dislocation can be reduced by the ER physician. To reduce a dislocation means to put the bone back in its place.

2) **SPRAIN:** name given to an injury involving the joint ligaments when they have been stretched out during a twisting motion. Typical example is an ankle sprain.

3) **MUSCLE STRAIN:** a strain is an injury to the body of the muscle or tendon resulting from overstretching, overextension, or misuse. It's commonly referred to as a "muscle pull". It's seen in athletes or in workers who do heavy labor with repetitive muscle overuse known as "CONTINUOUS TRAUMA".

4) **BURSITIS:** a bursa is a protective sac that protects and cushions our joints. The bursa sacs can become inflamed causing joint pain and tenderness.

5) **GANGLION CYST:** this is a little bump frequently seen in the wrists formed by fluid that has collected in the sheath that surrounds a tendon.

6) **CARPAL TUNNEL SYNDROME:** repetitive hand movements cause inflammation of the tendons that pass through the wrist below the carpal ligament (area known as the carpal tunnel). The inflammation of these tendons causes compression of the median nerve which runs in between the tendons in the carpal tunnel- this causes wrist pain, numbness and tingling in the fingers. The surgery to relieve the pressure on the median nerve is called a CARPAL TUNNEL RELEASE.

7) **EPICONDYLITIS:** The muscles of the forearm, which we use to flex and extend our wrists, attach to 2 bony prominences in the elbow called the epicondyles. This means that when the wrists are used a lot, like in tennis, golf or repetitive manual labor, the forearm muscles that attach to the epicondyles get inflamed resulting in a sore elbow. When the:
   - outer part of the elbow hurts, the doctors say the patient has a lateral epicondylitis aka TENNIS ELBOW because it's frequently seen in tennis players.
   - inner part of the elbow hurts, the doctors say the patient has a medial epicondylitis aka GOLFER'S ELBOW because it's frequently seen in golf players

8) **TEARS:** some of the more frequent ones are:
   - **ACL TEAR:** "ACL" stands for anterior cruciate ligament which is a ligament located deep inside your knee. If someone kicked the front of your knee hard enough it could get torn.
   - **MENISCAL TEARS:** each knee has two cushion-like cartilages called the menisci which help adapt the surfaces of the bones. Meniscal tears occur frequently.
   - **ROTATOR CUFF TEAR:** when we say rotator cuff we are referring to the muscles that surround the shoulder joint. There are 4 muscles that make up the rotator cuff and the one
most commonly affected is the supraspinatus which becomes inflamed (TENDINITIS) and may tear.

-ACHILLES' TENDON RUPTURE: the Achilles' tendon is located on the back part of the ankle. It is easy to feel. It can tear during sports.

9) HERNIATED DISK: involves the rupture of the central portion of an intervertebral disk, called the nucleus, which pokes through the disk wall and into the spinal canal. Similar to what happens when you squish a jelly donut! If the herniated disk “pinches” or impinges a nerve root this will causes pain. If the disk is deformed but its wall is still intact (not ruptured) then it is called a DISK BULGE.

10) TRIGGER FINGER: name commonly used to refer to tendinitis of a finger or two of the hand. Patient will say that the finger locks or "catches" when bending. The reason why they call it "trigger finger" is because when the finger unlocks it pops back suddenly as if releasing a trigger on a gun.

11) INGROWN TOENAIL: occurs when a toenail grows into the fleshy part of the corner of a toe causing inflammation and possibly infection.

12) BUNION (aka HALLUX VALGUS): is a deformation (like a little bump) of the joint at the base of the great toe.

13) PLANTAR FASCITIS: is the inflammation of the thick tissue located along the bottom of the foot called the plantar fascia due to overuse or overstretching of the fascia. Patients generally complain of heel pain.

14) RHEUMATISM: is a non-specific term for medical conditions that affect the joints and connective tissue. The diseases which fit into this category affect the bones and joints but can also affect other parts of the body and included in this group we have:

- RHEUMATOID ARTHRITIS: is a chronic systemic inflammatory disease that affects many joints, especially the smaller peripheral joints like hands and feet.
- SYSTEMIC LUPUS ERYTHEMATOSUS: also a chronic systemic disease like rheumatoid arthritis which affects connective tissue. It causes joint pain but also affects internal organs, especially the kidneys. Although not always there, a butterfly rash over the nose and cheekbones is characteristic of lupus.
- ANKYLosing SPONDYLITIS: seen in older patients, this form of arthritis affects the spinal column causing spine deformities.
- POLYMYOSITIS: is a chronic, progressive disease which affects the skeletal muscles and is characterized by muscle weakness and degeneration. When there is a skin rash associated with the muscle symptoms the disease is called dermatomyositis.

15) OSTEOARTHRITIS aka DEGENERATIVE JOINT DISEASE (DJD): is a type of arthritis characterized by wear and tear of the joint cartilage and formation of bone spurs (known as osteophytes) which are bony prominences that appear in the vertebral spine and hands and are visible on X-rays.
16) **GOUT**: is a metabolic disease related to the buildup of **URIC ACID** in the blood which crystallizes in the joint causing it to get swollen and red (acute arthritis). It typically affects the joint at the base of the great toe.

17) **FIBROMYALGIA**: there seem to be more questions than answers regarding this disease which is a connective tissue disorder characterized by the diffuse (all over the body) muscle aches it causes. There is no inflammation in this disease and you will notice that doctors **don't prescribe anti-inflammatory** medication for this disease but **antidepressants** (not to treat depression but because certain antidepressants also calm pain).

18) **SEPTIC ARTHRITIS**: which occurs when a blood borne infection reaches the joints.

**SOME DIAGNOSTIC PROCEDURES**

1) **ARTHROCENTESIS**: a needle is placed into a joint to obtain a sample of fluid for analysis. An example is an arthrocentesis of the knee done to rule out septic arthritis.

2) **ARTHROGRAPHY**: is an x-ray of a joint obtained after a contrast medium has been injected into the joint. The contrast enhances the image. If, an MRI is done after the contrast is injected inside the joint then we have a

3) **MAGNETIC RESONANCE ARTHROGRAPHY**

4) **RHEUMATOID FACTOR**: is a blood test done to measure the presence of abnormal antibodies that appear in a number of connective tissue disorders such as Rheumatoid Arthritis.

**SOME TREATMENTS**

1) **PHYSICAL THERAPY**: is a branch of rehabilitative health that uses specially designed exercises and equipment. Physical therapists give patients therapeutic exercises to do, they apply cold or heat to areas of the body and manual therapy. They use **TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION (TENS)** and **ULTRASOUND** to help patients regain strength, mobility and fitness. At home there are forms of physical therapy used by patients to soothe their aches like applying an **ICE PACK** to reduce inflammation or a **HOT SHOWER, HOT COMPRESSES** or a **HEATING PAD** to calm pain.

2) **OCCUPATIONAL THERAPY**: has similarities with physical therapy but focuses more on patient regaining independence in their activities of daily living. A practical definition used defines occupational therapists as specialists in treating problems of the upper extremities.

3) **SHOCKWAVE THERAPY**: uses shockwaves (high energy ultrasound waves) to treat tendon pain by creating an inflammatory healing response in the tendons. Used to treat **tendonitis** in the elbow and plantar fasciitis for example.

4) **ACUPUNCTURE**: is a treatment based on the insertion of thin needles into specific points of the body. Done to provide pain relief.
5) **SPINAL MANIPULATION aka ADJUSTMENTS**: is done by **chiropractors** and consists in placing pressure on the spine, moving the joints beyond their normal range of motion **but not past the range of motion that the joint is designed for**. Joints habitually **pop or crack** during this procedure which is done **to alleviate pain**.

6) **SURGERY** : orthopedics is a very surgical specialty

- **MICRODISKECTOMY** is a **minimally invasive** procedure where they **clean out the herniated part of the disk**. It's done using a small incision.
- **DISKECTOMY** is the **removal of the herniated disk**.
- **LAMINECTOMY**: consists in **removing a segment of the vertebra: the lamina**.
- **FORAMINOTOMY**: this procedure **enlarges the space** through which nerve exits the spinal column (the foramina)
- **SPINAL FUSION**: when the **entire disk is removed, it's necessary to replace it with something**. It is usually replaced using a **bone graft** usually taken form the patient's own pelvic bones. A hollow cylinder called a **spacer** or "cage" is placed between the vertebrae and the bone graft goes inside of it. **Plates and screws** are generally used to keep the vertebrae from moving while the graft "sticks" to both vertebrae. This type of surgery is called a spinal fusion. There is an alternative to spinal fusion which is: **ARTIFICIAL DISK REPLACEMENT** where the disk is replaced by metal plates and a plastic spacer.

When you hear a word that ends in “plasty”, you know they are talking about doing surgery to **repair or replace** something

**PLASTY = SURGICAL REPAIR/ REPLACEMENT**

So in essence the **artificial disk is a spinal arthroplasty**. What other joints undergo arthroplasty?

Examples of arthroplasty (joint repair/ replacement) are:

**A) KNEE REPLACEMENT**: knee joint replaced by a **metal prosthesis**.

**B) HIP REPLACEMENT**: the hip joint is a "ball and socket" type joint. The ball-in this case-is the head of the femur and the socket is the acetabulum of the hip bone. In hip replacement surgery, the **head of the femur is cut out** and replaced by a **metal or ceramic ball** called a **PROSTHESIS** as seen in this X-ray to your left hand side. The damaged **hip socket is also fitted with a metal prosthesis**. Bone is replaced by metal. It is indicated in cases of hip fractures or severe hip arthritis in **older patients**.

**C) HIP RESURFACING**: differs from hip replacement in that the **head of the femur is not cut off**. It is reshaped (resurfaced) and **capped with a metal prosthesis**. Useful for **younger patients** because it leaves more bone intact should a future total hip replacement be necessary.
Now when you hear a word that ends in "ectomy" that means “to remove”

**ECTOMY = REMOVE**

So a **BUNIONECTOMY**: is a surgery done to remove a bunion.

7) **ARTHROSCOPY**: surgical method which employs the use of a fiberoptic endoscope-called an arthroscope- that has a light on its tip and through which the surgeon repairs tears in tendons, the menisci, or ligaments. The arthroscope is introduced into the joint cavity through small incisions called "portals". The advantage to this type of surgery is a shorter postoperative period making most arthroscopies outpatient procedures (back home same day).

8) **AMPUTATION**: is the loss of a part of or all of a limb. May occur in an accident or in an OR because sometimes it is necessary to amputate a toe or part of the foot to treat gangrene. When a partial amputation is done the part that's left is called the STUMP

9) **REHABILITATION**: after surgery comes rehabilitation which includes different types of physical therapies given to recover a lost function. In other words, the goal of rehabilitation is to recover the range of motion of an injured or operated joint or to learn to walk again after a neurological injury (like a stroke for example).

10) **BRACES**: are orthopedic elements given to immobilize and provide support to different joints. Examples are back braces and a knee brace.

11) **ORTHOTICS**: is the name given to the insoles that are put into shoes to provide support for the foot.

12) **DURABLE MEDICAL EQUIPMENT (DME)**: name used to describe reusable medical equipment used in the home to improve the quality of living. DME includes: home oxygen equipment, hospital beds, CRUTCHES, WHEELCHAIRS, WALKER, etc.

Let's go over some of the drugs used:

13) **NON-STEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDS)** like IBUPROFEN (many times referred to by one of its brand names: Motrin). Other common NSAIDS are NAPROXEN and DICLOFENAC which is commonly referred to by one of its brand names: Voltaren.

14) **GOUT MEDICATIONS**: like
   - COLCHICINE: which is an anti-inflammatory drug and
   - ALLOPURINOL: which acts by reducing uric acid levels.

15) **PAIN MEDICATIONS** (aka ANALGESICS)
   - OPIATES/ OPIOIDES (aka NARCOTICS):
     - CODEINE
     - MORPHINE
     - HYDROCODONE (Brand name: Vicodin)
     - TRAMADOL (narcotic-like drug)
The term "narcotic" although pharmacologically correct in the sense that these drugs act on opioid receptors and can cause dependency, has a negative connotation for most patients and should not be used to refer to these medicines when prescribed for pain. However you will hear some doctors use it.

- ACETAMINOPHEN: is a non-narcotic analgesic drug which is commonly combined with opioids to treat severe pain and contrary to popular belief is not an anti-inflammatory drug. It is better known by its brand name: Tylenol.

16) MUSCLE RELAXANTS: reduce muscle tone and are used to treat the muscle tightness called muscle spasm associated with orthopedic injuries. An example of this type of drug is - CYCLOBENZAPRINE.

The medical doctors who specialize in injuries of the musculoskeletal system are: ORTHOPEDIC SURGEONS and PHYSIATRISTS. Medical doctors who specialize in treating rheumatic diseases are known as RHEUMATOLOGISTS.

Others who are not medical doctors but also work in this field are:
- PODIATRISTS
- CHIROPRACTORS
- ACUPUNCTURISTS and
- OCCUPATIONAL AND PHYSICAL THERAPISTS.

The medical specialties involved with the musculoskeletal system are: ORTHOPEDIC SURGERY and PHYSICAL MEDICINE AND REHABILITATION aka PHYSIATRY.

RHEUMATOLOGY is a branch of internal medicine that treats systemic diseases which also affect the joints and muscles.

**TERMINOLOGY REVIEW**

1) JOINTS: articulaciones
2) MUSCLES: músculos
3) TISSUES: tejidos
4) SHOULDER: hombro
5) ELBOW: codo
6) WRIST: muñeca
7) HIP: cadera
8) KNEE: rodilla
9) ANKLE: tobillo
10) TENDON: tendón
11) TRAPEZIUS: trapecio
12) PECTORALS: pectorales
13) DELTOID: deltoide
14) BICEPS: bíceps
15) TRICEPS: tróceps
16) GLUTEUS: glúteo
17) QUADRICEPS: cuádriceps
18) HAMSTRING: músculos isquiotibiales
19) EXTREMITIES: extremidades
20) ARTHRALKIA: artralgia
21) CRACK: tronar
22) POP: crujir
23) GRIND: rechinar
24) CATCH/ LOCK: atascarse, trancarse, trabarse
25) BUCKLE/ GIVE WAY: falsear, aflojar
26) STIFFNESS: rigidez
27) MUSCLE SPASM: espasmo muscular, contractura muscular
28) CRAMPS: calambres
29) DISLOCATION: luxación, dislocación
30) SPRAIN: esguince
31) MUSCLE STRAIN: distensión muscular
32) BURSITIS: bursitis
33) CONTINUOUS TRAUMA: lesiones por movimientos/esfuerzos repetitivos
34) GANGLION: ganglión
35) SHEATH: vaina
36) CARPAL TUNNEL SYNDROME: síndrome del túnel carpiano
37) CARPAL TUNNEL RELEASE: descompresión del túnel carpiano
38) EPICONDYLITIS: epiconditis
39) TENNIS ELBOW: codo de tenista (epiconditis)
40) GOLFER'S ELBOW: codo de golfista (epitrocleitis)
41) TEAR: desgarro
42) ANTERIOR CRUCIATE LIGAMENT (ACL): ligamento cruzado anterior
43) MENISCUS: menisco
44) ROTATOR CUFF TEAR: desgarro del manguito de los rotadores
45) TENDINITIS: tendinitis, tendinosis
46) ACHILLES' TENDON RUPTURE: rotura del tendón de Aquiles
47) HERNIATED DISK: hernia de disco
48) BULGED DISK: abombamiento discal
49) TRIGGER FINGER: dedo en resorte
50) INGROWN TOENAIL: uña del pie encarnada
51) BUNION: juanete
52) PLANTAR FASCITIS: fascitis plantar
53) RHEUMATISM: reumatismo
54) RHEUMATOID ARTHRITIS: artritis reumatoide, artritis reumatoidea
55) SYSTEMIC LUPUS ERYTHEMATOSUS: lupus eritematoso sistémico
56) ANKYLOSING SPONDYLITIS: espondilitis anquilosante
57) POLYMYOSITIS: polimiositis
58) OSTEOARTHRITIS/ DEGENERATIVE JOINT DISEASE (DJD): artrosis
59) URIC ACID: ácido úrico
60) GOUT: gota
61) FIBROMYALGIA: fibromialgia
62) SEPTIC ARTHRITIS: artritis séptica
63) ARTHROCENTESIS: arrocentesis
64) MAGNETIC RESONANCE ARTHROGRAPHY: artrografía por resonancia magnética
65) RHEUMATOID FACTOR: factor reumatoideo
66) PHYSICAL THERAPY: fisioterapia
67) ICE PACK: compresa de hielo
68) HOT SHOWER: ducha caliente
69) HOT COMPRESSES: compresas calientes
70) HEATING PAD: almohadilla eléctrica
71) OCCUPATIONAL THERAPY: terapia ocupacional
72) SHOCKWAVE THERAPY: terapia de ondas de choque
73) TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION (TENS):
electroestimulación nerviosa transcutánea
74) TENS UNIT: electroestimulador
75) ADJUSTMENTS: ajustes
76) DISKECTOMY: discectomía
77) LAMINECTOMY: laminectomía
78) FORAMINOTOMY: foraminotomía
79) SPINAL FUSION: arrodesis vertebral, fusión vertebral
80) ARTIFICIAL DISK REPLACEMENT: reemplazo de disco intervertebral
81) DISK SPACER: separador vertebral
82) ARTHROSCOPY: artroscopía
83) ARTHROPLASTY: arthroplasia
84) HIP REPLACEMENT: reemplazo de cadera, prótesis de cadera
85) HIP RESURFACING: reparación de la superficie de la cadera
86) BUNIONECTOMY: extirpación de juanete
87) REHABILITATION: rehabilitación
88) BRACE: faja
89) FOOT ORTHOTICS: plantillas ortopédicas
90) DURABLE MEDICAL EQUIPMENT (DME): equipo médico duradero
91) WHEELCHAIR: silla de ruedas
92) WALKER: andador
93) CRUTCHES: muletas
94) ACUPUNCTURE: acupuntura
95) AMPUTATION: amputación
96) STUMP: muñón
97) NON-STERoidal ANTI-INFLAMMATORY DRUG (NSAID): antiinflamatorio no esteroideo (AINE)
98) IBUPROFEN: ibuprofeno
99) NAPROXEN: naproxeno
100) DICLOFENAC: diclofenaco
101) COLCHICINE: colchicina
102) ALLOPURINOL: allopurinol
103) ANALGESICS: analgésicos
104) ACETAMINOPHEN: acetaminofeno, paracetamol
105) OPIATE ANALGESICS: analgésicos opióceos
106) CODEINE: codeína
107) MORPHINE: morfina
108) HYDROCODONE: hidrocodona
109) TRAMADOL: tramadol
110) MUSCLE RELAXANT: relajante muscular
111) ORTHOPEDIC SURGEON: cirujano ortopédico, traumatólogo
112) PHYSIATRIST: fisiotraumatólogo
113) RHEUMATOLOGIST: reumatólogo
114) PODIATRIST: podiatra
115) CHIROPRACTOR: quiropráctico
In this presentation we have gone over many terms related to ORTHOPEDIC SURGERY, PHYSIATRY AND RHEUMATOLOGY while we discussed the anatomy and physiology of the MUSCULOSKELETAL SYSTEM. Signs and symptoms of sickness, diseases, diagnostic procedures and some treatments were also discussed. At the end of the presentation a list of 121 related terms were provided in English and the target language for you to review. I hope you've enjoyed this lesson and come away with a better understanding of the fields of ORTHOPEDIC SURGERY, PHYSIATRY AND RHEUMATOLOGY and the terms related to these fields of medicine.

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