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GERIATRIC CONSIDERATIONS IN ORTHOPEDICS: A LITERATURE REVIEW

Orthopedics

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ABSTRACT

The principles of geriatric medicine and surgery are the same as at any other age but they have to be applied with the utmost vigor from the moment of admission to the ultimate discharge from outpatients (so-called "total care.") The circumstances in which the patient lives, financial problems, the surgical condition, the concomitant medical afflictions, and the social services can best be used, nursing care and, most important, the morale of the patient all have to be carefully considered. It must be remembered that in the elderly loss of function means loss of independence1. Geriatric orthopedics essentially deals with all the musculoskeletal health related issue including osteoporosis, arthritis, disability, and musculoskeletal consequences of any systemic illness. Osteoporosis is the most common bone disease in humans, representing a major public health problem as outlined in Bone Health and Osteoporosis. It is characterized by low bone mass, deterioration of bone tissue and disruption of bone architecture, compromised bone strength and an increase in the risk of fracture.

KEYWORDS

Osteoporosis, Orthopedics, Bone Mineral Density, bone architecture.

Introduction:

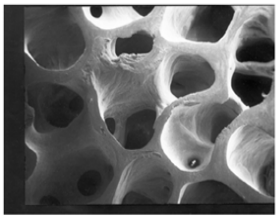
In good health the aged have to face many problems in any society to them illness comes as a catastrophe which can take away their independence. Healthy bones are strong bones. If we are to remain fracture free lifelong it is therefore desirable to grow a strong skeleton in youth, maintain this in middle life, and then slow the age related bone loss that makes the elderly skeleton osteoporosis. The principles of geriatric medicine and surgery are the same as at any other age but they have to be applied with the utmost vigor from the moment of admission to the ultimate discharge from outpatients (so-called "total care.") The circumstances in which the patient lives, financial problems, the surgical condition, the concomitant medical afflictions, and the social services can best be used, nursing care and, most important, the morale of the patient all have to be carefully considered. It must be remembered that in the elderly loss of function means loss of independence1. Geriatric orthopedics essentially deals with all the musculoskeletal health related issue including osteoporosis, arthritis, disability, and musculoskeletal consequences of any systemic illness. Osteoporosis is the most common bone disease in humans, representing a major public health problem as outlined in Bone Health and Osteoporosis. It is characterized by low bone mass, deterioration of bone tissue and disruption of bone architecture, compromised bone strength and an increase in the risk of fracture. According to the WHO diagnostic classification, osteoporosis is defined by BMD at the hip or lumbar spine that is less than or equal to 2.5 standard deviations below the mean BMD of a young adult reference population.

Osteoporosis is a risk factor for fracture just as hypertension is for stroke. The risk of fractures is highest in those with the lowest BMD; however, the majority of fractures occur in patients with low bone mass rather than osteoporosis, because of the large number of individuals with bone mass in this range.[2]

Definition: Osteoporosis is a systemic skeletal disease characterized by low bone mass and microarchitectural deterioration of bone tissue, with a consequent increase in bone fragility. Bone strength reflects the integration of two main features: Bone density and Bone quality

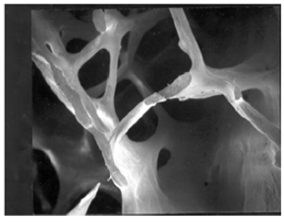
Basic Pathophysiology:

The process of bone remodeling that maintains a healthy skeleton may be considered a preventive maintenance program, continually removing older bone and replacing it with new bone. Bone loss occurs when this balance is altered, resulting in greater bone removal than replacement.



Normal bone

Fig No 1



Osteoporotic bone

Fig No 2

The imbalance occurs with menopause and advancing age. Bone loss leads to an increased risk of fracture that is magnified by other aging-associated declines in functioning. The factors associated with an increased risk of osteoporosis related fractures. These include general factors that relate to aging and sex steroid deficiency, as well as specific risk factors, such as use of glucocorticoids, which cause decreased bone formation and bone loss, reduced bone quality and disruption of microarchitectural integrity. Fractures result when weakened bone is overloaded, often by falls or certain activities of daily living. Bone remodeling cycle: About 10% of bone is undergoing remodeling at any given time. After about age 35 or so, bone resorption exceeds bone formation, and there is a net deficit after each remodeling event.

Approach to the diagnosis and management of osteoporosis: A detailed history and physical examination together with BMD assessment, vertebral imaging to diagnose vertebral fractures, and, when appropriate, the WHO year estimated fracture probability are utilized to establish the individual patient's fracture risk.[2]

Risk Assessment: All postmenopausal women and men age 50 and older should be evaluated for osteoporosis risk in order to determine the need for BMD testing and/or vertebral imaging. In general, the more risk factors that are present, the greater the risk of fracture. Osteoporosis is preventable and treatable, but because there are no warning signs prior to a fracture, many people are not being diagnosed

in time to receive effective therapy during the early phase of the disease. Many factors have been associated with an increased risk of osteoporosis.[1,2], and [3]

Factor affecting bone remodeling

Mechanical	Non mechanical
Gravitational force	Hormones
Weight of individual	Local factors
Physical activity	Age, Gender, Genetics
Muscular contractility	Diet
Effort	Work occupation
Prolong bed rest	Rheumatoid arthritis

Clinical Evaluation: the possibility of osteoporosis and fracture risk based on the presence of the risk factors and conditions. Metabolic bone diseases other than osteoporosis, such as hyperparathyroidism or osteomalacia, may be associated with low BMD. Any adulthood fracture may be an indication of osteoporosis and should be evaluated accordingly. Consider hip and vertebral fractures as indications of osteoporosis unless excluded by the clinical evaluation and imaging.

Vertebral fracture: Most common osteoporotic fracture, marker for future fracture risk, Many occur with every-day activities (lifting, pushing, pulling, etc.), Only 25% to 30% of vertebral fractures seen on x-ray are diagnosed clinically, Patients with clinical vertebral fractures may have severe pain and are confirmed with x-ray, Prevalent vertebral fractures in osteoporotic patients are associated with increased mortality.

Hip fracture: 2nd most common osteoporotic fracture, Approximately 1.6 million per year worldwide, Hip fracture is a marker for future fracture risk, Most are caused by fall from standing height, Only about 5% are "spontaneous" Only 1% of falls lead to hip fracture,

Diagnosis: Most are diagnosed clinically, Often confirmed with radiography, Most are hospitalized and require surgery.

Distal forearm fracture: Third most common osteoporotic fracture, Prior forearm fracture is a marker for future fracture, Most are caused by fall on outstretched hand, Most are diagnosed clinically and usually confirmed with radiography. [2,3,4].

Diagnosis:

The diagnosis of osteoporosis is established by measurement of BMD or fracture without trauma. The DXA measurements of the hip and spine are the technology used to establish or confirm a diagnosis of osteoporosis, predict future fracture risk and monitor patients. The difference between the patient's BMD and the mean BMD of the reference population, divided by the standard deviation (SD) of the reference population, is used to calculate T scores and Z score.[4,5].

WHO Definition of Osteoporosis Based on BMD		
Classification	**BMD**	**T--] score**
Normal	Within 1 SD of the mean level for young adult reference population	T score -1 or above
Osteopenia	Between 1.0 and 2.5 SD below that of the mean level for a young adult reference population	T score between -1 and 2.5
Osteoporosis	2.5 SD or more below that of the mean level for a young-- adult reference population	T score at or below 2.5
Sever osteoporosis	2.5 SD or more below that of the mean level for a young-- adult reference population	T score at or below 2.5

Biochemical Markers of Bone Turnover:

Bone remodeling (or turnover) occurs throughout life to repair fatigue damage and microfractures in bone and to maintain mineral homeostasis. Biochemical markers of bone remodeling [e.g., resorption markers-- serum C--telopeptide (CTX) and urinary N--telopeptide (NTX) and formation markers-- serum bone specific alkaline phosphatase (BSAP), osteocalcin (OC) and aminoterminal propeptide of type I procollagen (PINP)] are best collected in the morning while patients are fasting.[4]

Additional Bone Densitometry Technologies

CT- based absorptiometry.
Quantitative computed tomography (QCT)
Peripheral dual energy aborbstiometry (p DXA)
Quantitative ultrasound densitometry (QUD)
Trabecular Bone Score (TBS).4, 5.

Recommendation: An adequate intake of calcium and vitamin D, lifelong participation in regular weight-bearing and muscle strengthening exercise, cessation of tobacco use, identification and treatment of alcoholism, and treatment of risk factors for falling. Advise all individuals to obtain an adequate intake of dietary calcium. Providing adequate daily calcium and vitamin D is a safe and inexpensive way to help reduce fracture risk. A balanced diet rich in low fat dairy products, fruits and vegetables provide calcium as well as numerous nutrients needed for good health. If adequate dietary calcium cannot be obtained, dietary supplementation is indicated up to the recommended daily intake.

Treatment: The goal of treatment is fracture prevention. The strongest predictors of fracture are previous fracture(s), fall(s), low BMD and advancing age,

- Non-pharmacologic Management: Resistive exercises – walking, Rowing machine, Weight lifting, Fall prevention, Assess gait and fall risk (e.g. "get up and go" test) -Gait training -Home safety evaluation-Assistive devices as appropriate, Hip protectors, supplements. Calcium-provide 1,500 mg per day from diet and/or supplements-examples of dietary sources include: milk = 300 mg per 8 oz, yogurt = 350 mg per cup broccoli = 100 mg per cup seaweed = >1000 mg per serving, supplements calcium carbonate calcium citrate.
- Antiresorptive (i.e., antiosteoclastic) treatments –estrogen: conjugated estrogen 0.625 mg daily is efficacious in preventing fractures; however, the overall risk outweighs the benefit. This treatment is no longer recommended for osteoporosis.
- Selective estrogen receptor modulators (SERMs):
- Raloxifen 60 mg daily is approved for the treatment (and prevention) of osteoporosis. It is efficacious in reducing the risk of vertebral fractures and reduces the risk of breast cancer. Calcitonin nasal spray 200 IU per day reduces the risk of vertebral fractures. The drug is well tolerated, but probably less effective than other agents.
- Three bisphosphonates are widely used for the treatment or prevention of osteoporosis as first line agents. Alendronate (70 mg p.m. weekly or 10 mg p.m. daily), Risedronate (35 mg p.m. weekly or 5 mg p.m. daily), Ibandronate (150 mg once monthly or 2.5 mg daily). All three drugs are efficacious in reducing fractures.
- Calcitonin Nasal Spray
- Newer drugs: Teriparatide: rhPTH, Strontium.6

Osteoarthritis

- Osteoarthritis is a joint inflammation that results from cartilage degeneration. Osteoarthritis can be caused by aging, heredity, and injury from trauma or disease. With aging, the water content of the cartilage increases, and the protein makeup of cartilage degenerates.

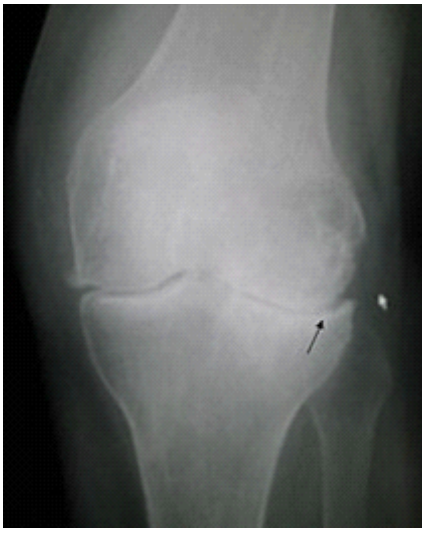


FIG NO. 3

- **Symptoms & Diagnosis of OA:** Frequently, OA patients complain of-Stiffness in a joint after getting out of bed or sitting for a long time, Swelling and pain in one or more joints, A Crunching feeling or the sound of bone rubbing on bone,**If your skin turns red or you feel hot, you may not have OA; it could be of another cause, such as rheumatoid arthritis Common Ways to Diagnose OA, Patient's Clinical History and Physical Exam
- **Impact on Daily Life-** Osteoarthritis affects each person differently. Some people have few symptoms despite the deterioration of their joints. Others experience pain and stiffness that may interfere with daily activities. If bony knobs develop in the small joints of the fingers, tasks such as buttoning a shirt can become difficult. Osteoarthritis of the knees or hips can lead to a limp. And Osteoarthritis of the spine can cause debilitating pain and/or numbness.
- **Diagnosing Osteoarthritis** symptoms in detail, including the location and frequency of any pain. Examine the affected joints and X-rays or other imaging studies to see how much damage there is, and to rule out other joint conditions. In many cases, blood tests are used to rule out other forms of arthritis.
- **Goals of Treatment:** Control Pain, Improve Joint Function.7, 8

Treatment Options:

- Exercise, Strengthening, Aerobic, Agility, Weight Control, Surgery. Complementary Methods, Acupuncture, Nutritional Supplements, Restore Lifestyle, Maintain Normal Weight, Pain Medications, Acetaminophen, Corticosteroids, Hyaluronic Acids.
- **Physical Therapy:** There is no treatment to stop the erosion of cartilage in the joints, but there are ways to improve joint function. One of these is physical therapy to increase flexibility and strengthen the muscles around the affected joints. The therapist may also apply hot or cold therapies such as compresses to relieve pain.
- **Supportive devices:** finger splints or knee braces, can reduce stress on the joints and ease pain. If walking is difficult, canes, crutches, or walkers may be helpful. In spine may benefit from switching to a firmer mattress and wearing a back brace or neck collar.
- **Medication:** When osteoarthritis flares up, many patients find relief with over-the-counter pain and anti-inflammatory medication, such as aspirin, ibuprofen, or acetaminophen. Pain-relieving creams or sprays can also help when applied directly to the sore area. If pain persists despite the use of pills or creams, an injection of steroids or hyaluronans directly into the joint.
- **Supplements:** Overall studies suggest no benefits of glucosamine and chondroitin – supplements available at pharmacies and health food stores touted for relieving pain and stiffness for people with osteoarthritis. Check before using chondroitin, especially if you take blood-thinners.
- **Osteoarthritis and Weight:** If you're overweight, one of the most effective ways to relieve pain in the knee or hip joints is to shed a few pounds. Even modest weight loss has been shown to reduce symptoms of osteoarthritis by easing the strain on weight-bearing joints. Losing weight not only cuts down on pain, but may also reduce long-term joint damage.
- **Osteoarthritis and Exercise:** People with osteoarthritis may avoid exercise out of concern that it will cause pain. But low-impact activities such as swimming, walking, or bicycling can improve mobility and increase strength. Training with light weights can help by lengthening the muscles that surround your joints. For example, strengthening the quadriceps can reduce pain in the knees. [8,9,10].

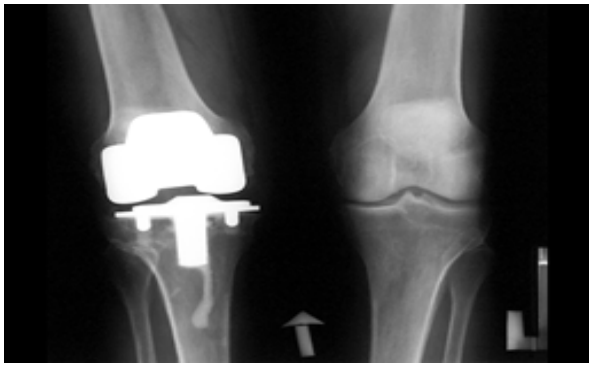


Fig no: 4

Geriatric Orthopedic Unit: The geriatric orthopedic unit is an ordinary ward with a nursing establishment for acute medicine. That the patients are geriatric increases rather than decrease the workload, not because they are in bed but for the very opposite reason: all patients are up and dressed daily. At the geriatric orthopedics unit the patient comes under the day-to-day care of the geriatric physician and his medical staff. The essential feature of the unit is the weekly ward round, at which both physician and surgeon and all members of the team attend; the latter includes the junior medical staff, the ward sister, physiotherapist, occupational therapist, medical social worker, and the ward secretary. The round eliminates paper work among the members of the team with its inherent delay. A comprehensive programme is achieved for all patients, either only for the next week or for the future after the patient's discharge. All patients in the unit are dressed each day and walk. There is no place in a geriatric orthopedics unit for the bedridden patient. The unit is geared to the patient partaking in the activities of daily living to the best extent possible. Each patient has a small bedside locker and wardrobe; his or her clothes and shoes are therefore kept at the bedside. The occupational therapist instructs and helps in dressing and the other activities of daily living in close co-operation with the physiotherapist who treats-and teaches to walk - each patient as necessary. It is most important to realize that an old person dressed feels "up," whereas in a dressing gown they feel they should be in bed. Meanwhile in the acute orthopedics ward those elderly patients not otherwise ill are discharged home without the necessity of a stay in the unit.[11]

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