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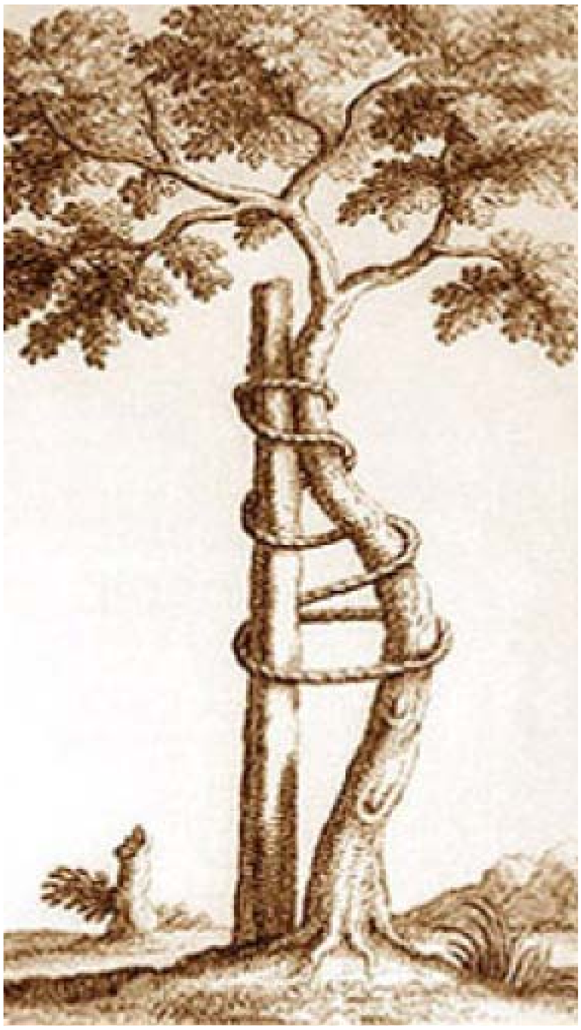

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Vasu Pai
Editor
Orthopaedic Surgeon

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1.Counterpoint: Should Rotator Cuff Tears Be Repaired Early?

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A recent guest editorial made several arguments in support of the opinion that rotator cuff tears should be repaired earlier. Dr Schneider's comments and literature review were excellent, but many do not share his views regarding rotator cuff tears.

A balanced treatment of the issues may temper the readers' enthusiasm with respect to operative treatment of rotator cuff tears.

While it is true that weakness can by itself be considered a symptom of a rotator cuff tear, patients do not typically seek treatment for a shoulder whose only symptom is weakness until the weakness becomes profound and limits their typical daily activities.

The study by Kim et al only found a significant decrease in abduction strength with large and massive rotator cuff tears. Therefore, small- to medium-size tears are often completely asymptomatic, that is, no perceived difference in strength compared to normal shoulders. It is the small- and medium-size tears that one would want to find if the goal was to repair rotator cuffs tears early to avoid the potential sequela of cuff tear arthropathy.

Even if it were cost-effective to screen asymptomatic patients for a rotator cuff tear, it likely would not be beneficial to consider repairing these tears. Little is known about the natural history of rotator cuff tears, but a recent evaluation of patients with rotator cuff tears revealed that asymptomatic tears were less likely to progress.

Certainly when patients with pain and dysfunction have failed nonoperative treatment and then undergo rotator cuff repair, they generally enjoy an improvement in their pain and function. However, the results seen in patients younger than 50 years left many patients dissatisfi ed. In addition, modern retear rates after rotator cuff repair are reported as 5% to 50%.

The sequela of a neglected rotator cuff tear can progress to cuff tear arthropathy (CTA). Until the advent of modern reverse shoulder designs, arthroplasty treatment of CTA was defined by "limited goals" and frequently resulted in the surgeon and patient being dissatisfied.

As Dr Schneider reported, the annual rate of reverse shoulder arthroplasty has risen each year since being made available in the United States in 2004. However, the majority of these have been performed in patients with failed surgery. Indeed, in the literature only approximately one-third of reverse shoulder arthroplasties are performed for CTA with no prior history of surgery.

Certainly the reported complication rate of reverse shoulder arthroplasty (RSA) has led some to be reluctant to accept this technology. A closer analysis leads to two observations. First, as with most novel technologies, the reported complication rate following RSA has declined as surgeons have gained more experience. Second, many of the complications reported occurred in patients undergoing RSA for a failed surgery.

While our knowledge of rotator cuff tears is constantly improving, the current literature does not support routine screening and repair of asymptomatic rotator cuff tears as a preventive measure. Such an approach would certainly lead to unnecessary repairs in patients whose tears would not have become symptomatic, and would lead to postoperative complications in patients whose tears were previously asymptomatic.

2. Fusion Versus Disk Replacement for Degenerative Conditions of the Lumbar and Cervical Spine: Quid Est Testimonium?Kishen. Orthop Clin N Am 41 (2010) 167–181

Quid est testimonium (in Latin, ‘‘what is the evidence’’)? With 70% of the population likely to have at least one episode of neck and back pain in their lives

Lumbar TDR is indicated in the management of discogenic back pain without facet arthritis; however, 95% of potential surgical patients are likely to have a contraindication for lumbar TDR

This article compares the outcomes of spinal fusion and disk replacement for degenerative conditions of the lumbar and cervical spine.

LUMBAR FUSION

Spinal fusion, with or without supplementary instrumentation, can be performed through a posterior (posterolateral fusion, posterior lumbar interbody fusion, and transforaminal lumbar interbody fusion), anterior (anterior lumbar interbody fusion [ALIF]), or combined approach (anteroposterior fusion).

Despite the increasing number of lumbar fusions being performed, there are numerous unresolved issues including the efficacy of the procedure, potential for accelerated adjacent level degeneration (ALD), pseudoarthrosis, and bone graft donor site morbidity. Stiff fusion constructs in the lumbar spine lead to abnormal stresses on the adjacent levels potentially leading to accelerated ALD.

1.Although the significance of radiologic ALD is unknown, the rate of symptomatic ALD requiring either decompression or fusion is predicted to be 17% at 5 years and 36% at 10 years following spinal fusion.

Nevertheless, the debate continues whether the ALD is in reality a natural progression of the degenerative process.

2.Wide variations in the rate of pseudoarthrosis (nonunion) have been reported (2.3%–83.3%) following lumbar fusion,24 and can have a negative impact on the clinical outcome.

3.Donor site morbidity at the bone graft harvest site is another cause for concern. Alternatives to autograft, such
as allograft and bone morphogenetic protein (BMP), have shown equivalent outcomes; however, the use of BMP increases the cost of the procedure substantially.

4.What are the Outcomes of Lumbar Fusion for Degenerative Disease?

A review of literature[30] analyzed the influence of subdiagnosis on the outcome of lumbar fusion and found significantly better clinical outcomes for spondylolisthesis compared with degenerative disk disease.

Buttermann and colleagues[31] reported satisfaction rates of 100%, 76%, and 69% in patients who underwent fusion for spondylolisthesis, disk degeneration, and postdiskectomy, respectively.

Several studies have reported better clinical outcomes following a circumferential fusion for patients with degenerative disk disease whereas others did not find any difference between various methods of fusion. A metaanalysis, there was no significant difference in the global assessment

Another systematic review concluded that fusion is no more effective than intensive rehabilitation but associated with small to moderate benefits compared with standard nonsurgical therapy.

A meta-analysis of randomized trials concluded that cumulative evidence did not support surgical fusion for the treatment for chronic low back pain. The details of studies comparing fusion with nonoperative treatment. The clinical outcomes following fusion for spondylolisthesis are favorable, whereas for lumbar disk degeneration, it is unclear whether fusion is more efficacious than a structured nonoperative program.

Lumbar TDR

Fernstrom's early attempts to retain segmental motion (1950s) using metallic balls led to subsidence because of the small area of contact and disparity in the modulus of elasticity between the TDR, by restoring disk height, segmental lordosis, and segmental motion, can potentially reduce the risk of accelerated ALD. Biomechanical analysis has shown that the disk prosthesis preserved physiologic loading at adjacent nonoperated levels compared with spinal fusion.

A retrospective radiographic study of 42 patients followed for 8 years following lumbar TDR showed that implanted prosthesis exhibiting greater than 5 degrees of motion revealed 0% and those with less than 5 degrees of motion showed a 34% incidence of ALD. TDR obviates the need for bone graft thereby avoiding donor site morbidity and the need for the expensive BMP to augment the fusion.

Charite´ Artificial Disk Prosthesis Ninety percent of 100 patients implanted with the Charite´ III prosthesis (Depuy Spine, Raynham, MA, USA) reported good to excellent results (Modified Stauffer Coventry Scale) at 10 years with 80% returning to their previous employment.

Although no prosthesis failure was reported, five patients underwent a secondary fusion. David[51] reported the 10-year outcomes (mean follow-up, 13.2 years) following one-level disk arthroplasty with the Charite´ prosthesis in 106 patients. A total of 82% of the patients reported excellent or good clinical outcomes and 90% of implanted prostheses were mobile at the last follow-up. Eight patients (7.5%) underwent a posterior fusion at index level and three (2.8%) underwent adjacent-level surgery.

In the FDA investigational device exemption (FDA-IDE) study,[52] patients with single-level disk degeneration between L4 and S1 were randomized to undergo either a Charite´ prosthesis implantation (N 5 205) or a stand-alone anterior fusion with cages and autograft (N599). Clinical success at 2 years, defined as absence device failure, major complications, or neurologic deterioration and greater than 25% improvement in ODI score, was achieved in 57% of TDR patients and 46% of the fusion group (P<.05). The study concluded that the 2-year clinical outcome was equivalent to anterior fusion and subsequently the Charite´ III device was approved by the FDA for implantation in patients with one-level disk degeneration from L4 to S1 who had failed at least 6 months of conservative treatment. Five-year follow-up of 90 Charite´ and 43 BAK fusion patients from the IDE study[53] (44% of initial cohort) showed an overall success rate of 57% and 51%, respectively (P 5 .0359). The improvement in the visual analogue scale (VAS) and ODI was similar in both groups at 2 and 5 years. The results at 5 years were similar to the 2-year results demonstrating noninferiority of the Charite´ group versus anterior fusion.

ProDisc-L Artificial Disk Prosthesis

Fusion Versus TDR

With burgeoning health care expenditure, cost benefit analysis of new technology needs careful consideration.

Summary: Lumbar Fusion Versus TDR The short-term outcomes of lumbar TDR are equivalent to that following lumbar fusion. The cost of TDR in United States hospitals seems to be less than or equal to fusion. Lack of adequate long-term follow-up data prevents an analysis of the potential benefit of TDR in preventing or reducing the incidence of ALD.

CERVICAL SPINE

ACDF Versus Cervical TDR

Two-year follow-up of a randomized controlled trial[71] of 99 patients with one-level disk disease who underwent either ACDF or cervical TDR.

Significantly better outcomes in the domains of neck disability index, arm and neck pain, and the SF-36 physical component score were found in the TDR group.

Revision surgery was performed in four patients from the fusion group for non-union

THE PHILOSOPHY

In the presence of the ‘‘refuse to fuse’’ group, the ‘‘I don’t believe in disk replacement’’ group, and the extensively Internet-educated patients pulling in different directions, it can become a challenge for a voice of rationality to be heard.

Based on evidence from literature, clinical experience, and a collaborative effort with patients, the authors practice a stepwise approach for the management of chronic degenerative low back pain (excluding spondylolisthesis and stenosis) and neck pain.

Following a diagnostic work-up, patients undergo an intensive rehabilitation course consisting of structured physiotherapy that incorporates cognitive training and a psychologic assessment. Facet injections are performed as a diagnostic and therapeutic measure, being fully aware of its limitations.

If there has been no improvement at the 3-month mark, patients are reassessed by the surgical team with input from physiotherapists. If there is no clinicoradiologic correlation and the patient continues to suffer from severe pain, pain pharmacotherapy is initiated.

If a surgically treatable organic cause of the symptoms is elucidated, the patient is offered surgery based on a shared decision-making process. The approach to surgical decision making for one-level disk lumbar disorders is detailed in Fig. 1.

The chart and approach is not valid for (1) two-level disk disease where one level exhibits advanced degeneration and the second level exhibits early stage degeneration, (2) postmicrodiskectomy states, (3) adjacent-level disk degeneration, and (4) degenerative disk disease with segmental coronal plane deformity or early lumbar degenerative scoliosis. A discussion on these conditions is outside the scope of this article.

A similar stepwise approach is followed while managing cervical degenerative conditions.Because cervical disk replacement is not funded by the Australian federal government at this stage,most eligible patients undergo an ACDF.

SUMMARY

In the absence of a magic wand to cure chronic degenerative axial spinal pain, a holistic approach incorporating a stepwise approach starting with nonoperative modalities (physiotherapy, spinal injections, pain counseling, and pharmacotherapy) is advisable. Surgery in the form of either spinal fusion of TDR should be reserved for recalcitrant cases. Although the short-term clinical outcomes following fusion and disk replacement are similar,TDR has the potential to reduce the incidence of ALD and obviate the complications associated with autologous bone graft.

3.**Contemporary Management of Symptomatic Lumbar Spinal Stenosis. Orthop Clin N Am 41 (2010) 183–191**

Lumbar spinal stenosis is a common cause of impaired quality of life and diminished functional capacity in the elderly.1 With the aging of the United States population, lumbar stenosis will be increasingly diagnosed and treated by primary care physicians and surgical and nonsurgical specialists alike. Because of the advance of noninvasive imaging modalities, spinal stenosis is becoming more frequently identified, and has become the most frequent cause for spinal surgery in patients older than 65 years The rate of spinal surgery in the Medicare population has increased

Despite the ubiquitous nature of this condition, considerable controversy exists regarding the preferred treatment, and many commonly used treatments lack high-level evidence regarding their efficacy.

PATHOPHYSIOLOGY AND CLINICAL PRESENTATION

Classified :

Congenital Rare

Acquired (degenerative).

The anatomic changes responsible for degenerative lumbar spinal stenosis show considerable overlap with those that are seen during the normal aging of the lumbar spinal motion segment. Degeneration is believed to begin in the intervertebral disk where biochemical changes such as cell death and loss of proteoglycan and water content lead to progressive disk bulging and collapse. This process leads to an increased stress transfer to the posterior facet joints, which accelerates cartilaginous degeneration, hypertrophy, and osteophyte formation; this is associated with thickening and buckling of the ligamentum flavum. The combination of the ventral disk bulging and osteophyte formation and the dorsal facet and ligamentum flavum hyptertrophy combine to circumferentially narrow the spinal canal and the space available for the neural elements. This compression of the nerve roots of the cauda equina leads to the characteristic clinical signs and symptoms of lumbar spinal stenosis.

Patients with degenerative spinal stenosis are usually older than 40 years, and present with some combination of back and leg pain. The most specific presentation of lumbar spinal stenosis is neurogenic claudication. Patients develop a burning or aching pain in the lumbar region, buttocks, or lower extremities when in upright posture, and these are often associated with numbness, paresthesias, or subjective weakness.

Typically their symptoms are worsened by the extension of the spine, which exacerbates the pathologic narrowing of the spinal canal.
Patients report that standing, walking, and climbing stairs will cause symptoms to develop, and that these symptoms can be partially relieved by flexion of the spine, such as sitting or leaning forward (eg, pushing a shopping cart).
Impaired walking ability is often an important factor in causing these patients to seek treatment. Neurogenic claudication symptoms must be distinguished from vascular claudication, which can mimic spinal stenosis. Although neurogenic claudication is the most characteristic presentation of lumbar spinal stenosis, not all patients will exhibit this constellation of symptoms.
Many will report unilateral or bilateral radicular symptoms rather than true claudication. Neurologic findings on physical examination are unusual, and the diagnosis is generally made based on characteristic subjective complaints coupled with radiographic evidence of spinal canal narrowing from magnetic resonance imaging (MRI), computed tomography
(CT), or CT myelography.

NONSURGICAL TREATMENT
Although the role of surgery has certainly been debated in the treatment of lumbar spinal stenosis, little high-level evidence is available to recommend specific nonsurgical treatments.
As the symptoms of lumbar stenosis are slowly evolving, a trial of conservative treatment is generally recommended. Commonly used conservative treatments for lumbar spinal stenosis include activity modification, medications, physical therapy, home exercise therapy, and spinal injections.
Activity modification generally consists of the avoidance of those activities that place mechanical stress on the lower back, particularly those that place the spine in

extension, as this tends to exacerbate the symptoms. Although high-level evidence is lacking for the direct benefit of physical therapy or exercise for spinal stenosis, most clinicians believe that a program of core strengthening exercise and aerobic conditioning can be of benefit in maintaining functional independence in these patients.

Nonsteroidal anti-inflammatory drugs (NSAIDs) are amongst the most commonly used medications for degenerative spinal conditions, particularly acute low back pain. Opioid analgesics have numerous long term side effects including sedation, constipation, and the potential for dependency. Their use should be limited to controlling acute exacerbations of pain.

Epidural steroid injections (ESIs) may be beneficial in relieving radicular lower extremity symptoms in lumbar spinal stenosis. However, their use remains controversial and evidence regarding their effectiveness is conflicting.

In contrast, Riew and colleagues,20 in a double-blind, prospective randomized trial,found that 71% of surgical candidates injected with a combination of betamethasone and bupivacaine were able to avoid surgery at 13-month follow-up, as compared with 33% of the patients who received bupivacaine alone. This benefit seemed to be maintained at 5-year follow-up.

SURGICAL TREATMENT

The exact surgical procedure that needs to be performed depends on the exact pathoanatomy of the canal narrowing seen in any given patient.

Central stenosis most commonly occurs from a disk bulge anteriorly, or hypertrophied or infolded ligamentum flavum, or hypertrophic inferior articular facet posteriorly.

Lateral recess stenosis is narrowing in the subarticular recess, bounded by the takeoff of the nerve root from the dural tube to the medial border of the pedicle. Lateral recess stenosis is most commonly caused by hypertrophy of the superior articular facet or the lateral insertion of the ligamentum flavum

Standard surgical treatment of lumbar spinal stenosis consists of a decompressive lumbar laminectomy.

The medial border of the pedicle can be palpated from within the canal using a curved ball-tipped probe. A partial medial facetectomy is then performed.
The medial one-third to half of the facet is removed using Kerrison rongeurs. Finally, decompression of the nerve root in the neuroforamen can be performed with small
If the area of compression is more limited on preoperative imaging studies, a more limited
procedure such as a unilateral partial laminotomy and foraminotomy can be performed.
Two surgical techniques that deserve mention at this point are spinal fusion and Interspinous process devices.
The indications to perform spinal fusion in combination with laminectomy are controversial and are beyond the scope of this article. In general, spinal fusion is indicated in situations
whereby spinal instability is pre-existing

Interspinous process devices (eg, X-STOP) have recently emerged as an alternative to decompressive procedures such as laminectomy. A recent prospective randomized trial suggests that the use of one of these devices is superior to conservative care in the treatment of symptomatic lumbar spinal stensosis.
Interspinous process devices are a promising technology in the treatment of lumbar spinal
stenosis, but their exact indications and role in the treatment of stenosis remain to be seen.

The symptoms of spinal stenosis are slowly evolving, and most patients can safely undergo a trial of conservative treatment. Many patients with mild to moderate symptoms can expect little change over time. Commonly used conservative care includes activity modification, medication, physical therapy or a home exercise program, and epidural cortisone injections.

4.Cervical Spondylotic Myelopathy: Orthop Clin N Am 41 (2010) 193–202

Cervical spondylotic myelopathy (CSM) is the most common progressive spinal cord disorder in patients more than 55 years old. More than 50% of middle-aged patients show radiographic evidence of cervical disease, but only 10% have clinically significant root or cord compression.

There are multiple symptoms of myelopathy, including motor and sensory disturbances, but the onset is usually insidious. Lower extremities are affected first, and patients can complain of gait disturbance, with degeneration of the spinocerebellar and Corticospinal tracts.
The upper extremities can then become affected with loss of coordination and difficulty with fine motor tasks.2

The 4 current controversial topics that surround CSM are:
(1) natural history of mild CSM;
(2) surgical approach: anterior versus posterior;
(3) laminoplasty or laminectomy
(4)cervical arthroplasty for CSM.

NATURAL HISTORY
Traction and soft collars have not been shown to alter the natural course of the disease.
There have been several series studying patients treated conservatively, and 26% to 50% of patients may deteriorate neurologically over time.
Clark and Robinson4 found that 5% of patients deteriorate quickly, 20% have a gradual but steady decline in function, and 70% have a stepwise progression in their symptoms with variable periods of quiescent disease.4
These patients are also at increased risk of sustaining severe neurologic injuries with even minor trauma.8 Minor trauma can result in a central cord syndrome or in quadriplegia without fracture or dislocation.
Early treatment has also been shown to alter the prognosis in patients.treated within 1 year of onset of symptoms.

The 3-year study by Kadanka and colleagues15 followed 68 patients prospectively in a randomized controlled trial, and no patients were lost to follow-up.
Nonop: consisted of a soft collar, NSAID, and discouragementfrom high-risk activities. Surgical management: The disease in these patients was mild; the median cord compression was 71 mm2, : 1-level anterior discectomy and fusion.
There was a slight but significant difference in deterioration of the conservatively treated group in their activities of daily living. The investigators'conclusions were that for mild CSM nonoperative treatment was as effective as surgical decompression, and that patients can be successfully treated nonoperatively for up to 3 years.
A prospective questionnaire was used by Sampath: The investigators noted that surgery was associated with improved functional status and improved neurologic status, which correlated directly with patient satisfaction.
Patients may be successfully treated conservatively if they have lower mJOA scores, minimal neurologic findings (normal central motor conduction times), spinal transverse area greater than 70 mm2, and are older patients.
Surgery was successful for patients with more severe neurologic symptoms, a hyperintense signal on MRI with localized disease and who had canal expansion greater than 40% postoperatively, and were of younger age.

Present trend: If the disease is mild and the symptoms are mild, I prefer to watch these patients closely with regular scheduled visits. If the patient has significant symptoms of myelopathy, including walking and balance difficulty, poor hand coordination, or progressive neurologic decline, I favor early surgical decompression.

SURGICAL APPROACH

The principle goal of any approach is to increase the canal diameter and provide the cord with adequate room to avoid static or dynamic compression.
However, there are multiple factors that must be taken into account when considering anterior versus posterior decompression.
Cervical sagittal alignment is an important consideration because it affects the type of surgical approach. In kyphotic spines, posterior decompression will not allow the spinal cord to drift posteriorly and may increase the tension on the spinal cord if the kyphosis progresses. It is not always possible to correct the sagittal alignment through a posterior approach; anterior reconstruction with lordotic spacers may allow the

patient to regain cervical lordosis. Fusion of the spine in a kyphotic position increases the abnormal forces on the vertebral column and may lead to increased degeneration and further disk disease. There is no clear evidence that either anterior or posterior decompression more reliably affects recovery from myelopathy.

Anterior Versus Posterior

Several studies have assessed the advantage or disadvantage of anterior and posterior cervical approaches to treat CSM.

The conclusions made by the investigators stated that the anterior and posterior approaches have similar clinical outcomes, with and posterior fusion for adequate decompression and stabilization.

For patients with significant neck pain the anterior approach is favored.. Progressive CSM is a disease of cervical compression and neurologic decline, and the associated cervical pain is of secondary importance. Therefore, laminoplasty with its ability to address multiple levels, and limited short- and long-term morbidity, despite neck pain, is the author’s procedure of choice.

CERVICAL ARTHROPLASTY

The investigators concluded that for limited disease, disk arthroplasty performed as well as a single-level fusion for neurologic function,

5. PDH. JAOSS April 2010, Vol 18, No 4, 199

A simple hip dislocation is one without fracture of the proximal femur or acetabulum. Complex fracture-dislocations involve the acetabulum, femoral head, or femoral neck. The incidence of posttraumatic arthritis is much lower in simple dislocations than in fracture-dislocations.

The most common mechanism of injury is a high-energy motor vehicle accident, which is usually associated with other systemic and musculoskeletal injuries.

The hip should be reduced emergently in an atraumatic fashion. For acetabular fracture, intraoperative stress views may be necessary to evaluate for instability and to determine whether surgical fixation is required.

The appearance of a concentric reduction on plain radiographs and CT does not rule out intra-articular hip pathology; such injury may contribute to long-term degenerative changes.

Other complications of hip dislocation include osteoarthritis, osteonecrosis, and sciatic nerve injury. Indications for surgical management include nonconcentric reduction, associated proximal femur fracture (including hip, femoral neck, and femoral head), and associated acetabular fracture producing instability.

Surgical management ranges from formal open arthrotomy to minimally invasive hip arthroscopy. Hip arthroscopy has become popular for treating intraarticular hip pathology, including loose bodies, chondral defects, and labral tears.

Arthroscopy

Byrd performed hip arthroscopy for persistent hip pain in 15 traumatic injuries, of which 6 were dislocations. Thirteen of the 15 hips had associated findings at the time of arthroscopy, including labral tears, chondral damage, and loose bodies. Neglected labral pathology may be sufficient to incur more damage.

Specifically, an inverted labrum can lead to premature OA. Degenerative changes may also be perpetuated, such as with third-body wear caused by retention of loose bodies.

McCarthy and Busconi23 determined that 76% of loose bodies were not diagnosed on conventional radiographs.

The authors also determined that the presence of a concentric reduction on plain radiographs and no evidence of loose bodies on CT did not correspond with a clean joint. In fact, they found loose bodies in seven of nine cases (78%) that were predicted

to be free of intraarticular pathology by both radiographs and thin-cut (2- to 3-mm) CT scan.
Although there is basic science evidence to suggest that hip arthroscopy may be beneficial for patients because it enables detection of loose bodies, no clinical evidence supports this. If arthroscopy is being considered to evacuate loose bodies from the joint, the senior author prefers to proceed with arthroscopy within 72 hours of injury to prevent further damage to the articular cartilage.
Arthroscopy is a safe alternative to arthrotomy for addressing intra-articular pathology, and it has several advantages over arthrotomy
Sahin et al7 retrospectively reviewed 62 cases of hip dislocation, 50 of which were managed with closed reduction. Neither the type of postreduction treatment (traction or bed rest) nor
the time to full weight bearing influenced outcomes significantly. Given the lack of evidence to support a routine postdislocation protocol, return to weight bearing should be left to the surgeon's discretion.

Complications

1. A timely reduction decreases the time of ischemia, theoretically improving the chances of survival of the femoral head.

Hougaard and Thomsen31 retrospectively evaluated 100 hip dislocations after a minimum 5-year follow-up and found that 4% of patients reduced within 6 hours developed osteonecrosis and 58% of hips that were reduced later than 6 hours developed osteonecrosis.

The risk of osteonecrosis is substantial and may occur in up to one third of dislocations, depending on the severity of injury. Thus, the initial damage incurred at the time of injury is another important factor in determining treatment outcome. Higher-energy injuries with more damage to the surrounding blood supply tend to result in a higher incidence of osteonecrosis.

Posttraumatic coxarthrosis is the most common complication after hip dislocation.

Upadhyay et al29 reported a 16% incidence of posttraumatic coxarthrosis and an 8% incidence of coxarthrosis secondary to osteonecrosis.

The rate of both posttraumatic coxarthrosis and osteonecrosis is much higher for posterior fracture-dislocation, with an incidence of up to 70%.5

Sciatic nerve palsy occurs in approximately 10% to 15% . The peroneal division is most commonly affected, likely because of the anatomy and composition of the peroneal division

6. Failure of Fracture Plate Fixation.Garner Vol 17, No 10 647

Biologic and mechanical factors must be considered. Biologic considerations include traumatic soft-tissue injury and atrophic fracture site. Common mechanical reasons for failure include malreduction, inadequate plate length or strength, and excessive or insufficient construct stiffness. Reliance on laterally based implants in the presence of medial comminution may be a cause of fixation failure and subsequent deformity, particularly with conventional nonlocking implants.

Determination of Specific

Causes

A thorough patient workup may reveal potential underlying causes such as

a.immunosuppressive medications,

b.Infection

c.Osteoporosis.

All failed fixation cases should be scrutinized for technical adequacy.

The first determination should be whether rigid, absolute stability or flexible, relative stability was attempted.

Absolute Versus Relative Stability

Rigid fixation is required to achieve absolute fracture stability. Anatomic reduction and compression fixation is usually the preferred technique when plating transverse, short

oblique, or simple diaphyseal and metaphyseal fractures.

The placement of more screws per fracture fragment increases construct stiffness to a point, particularly in torsion.

However, there are negative consequences: Each screw creates an additional stress riser when the implant is removed, and each drill pass through the intramedullary canal, opposite cortex, and periosteum causes additional vascular insult.

The length of the implant around the area of fracture

that is unsupported by screws is known as the **working length.**

<u>This length is a major determinant of construct stiffness.</u>

With compression plating technique for simple fractures, plate

stress <u>is minimized by placing screws with maximum spacing near</u>

<u>the fracture and at the ends of the plate</u> (ie, near-near, far-far).

In a failed construct in which absolute stability was attempted,

a plate that is too short, too small, or too flexible, <u>with associated</u>

callus formation, can signal technical shortcomings that may have contributed to the failure.

Until recently, bridge plating techniques using more flexible plate fixation constructs were not widely employed. Several studies have clarified that minimizing soft-tissue dissection by use of indirect reduction techniques, and bridging fractures with stable, somewhat flexible fixation, may be preferable in managing many comminuted extraarticular fractures.

To maintain implant stability until healing occurs, a plate of adequate length (usually as long as is anatomically reasonable) should be chosen for distribution of stresses. It is equally important to achieve an appropriate amount of sustained micromotion to permit callus formation. Construct stiffness should be considered when analyzing an instance of failed fixation.

Construct Stiffness and Plate Length

Construct stiffness can be controlled by many variables, including the implant material, offset from the bone, plate length, and working length.

Despite the assumptions of many biomechanical studies, more rigid fixation is not always advantageous to healing. To allow for uneventful healing when a plate is used in a bridging application, the construct stiffness must be neither too low nor too high

It is possible to create a construct that is too stiff and thus allows too little fracture micromotion to lead to callus formation

Little empiric evidence exists that is helpful in guiding construct creation with the ideal stiffness.

In both locking and nonlocking constructs, at least two or three empty plate holes at the fracture site are typically necessary to allow adequate construct flexibility when bridging a fracture; two or three holes also are needed to avoid stress concentration on the plate that could lead to early plate failure. The constraints of the fracture pattern dictate many aspects of the fixation. The ideal number and spacing of screws to allow for successful bridge plating has yet to be fully delineated in a biologic model, and additional research is necessary before definitive recommendations can be made.

Plate length is extremely important;

this is another parameter that
should be closely analyzed in a failed
construct.
When a longer plate is used as a neutralization plate in a construct requiring absolute stability, fewer screws are necessary to achieve greater strength, as long as they are widely spaced.
The fracture site stiffness depends in part on the number of screws, either locking or nonlocking, and the working length. Local anatomy and potentially increased soft-tissue dissection also must be taken into account when deciding on plate length.
Plate breakage at the fracture site may be caused by an excessively long working length, leading to insufficient stiffness and thereby resulting in large plate deviations and early fatigue failure. Biologic failure must also be considered in this setting.

Many cases of **screw pullout or catastrophic failure** are caused by placement of an implant of inadequate length that did not effectively absorb and transfer force to the end screws.

Stiffness mismatch between implant and bone may cause **secondary fracture at the end of the plate.**

When an overly stiff implant is applied, as when too many screws are used, the stress at the level of transition may lead to failure.
1.The construct stiffness, stress concentration
2. Too many screws and a significant stiffness mismatch between
the plate and bone can impair callus formation.
3 Both of these scenarios occur frequently in osteoporotic bone

The surgeon must be aware that although increasing the number of
screws can increase the total surface area of implant purchase,
this also leads to a potentially detrimental increase in
overall construct stiffness.

Locking Plates

Locked plating represents a novel biomechanical approach for fracture fixation and has clear advantages.

A key principle in the use of locking plates is to follow the correct temporal sequence; reduction must be obtained before locking screws are placed.

As with standard plates, locking plates can fatigue and fail when the bone is unable to assume timely load transmission. In particular, fractures with associated medial comminution have a tendency to fail in varus, such as in the proximal humerus, proximal femur, and proximal tibia. Laterally based locking plates offer a potential solution for the stabilization of difficult metadiaphyseal fractures.

Clinical scenarios such as osteoporosis and comminuted metaphyseal fractures with short end segments may benefit from fixed-angle stabilization.

Additionally, open fractures may be at risk for prolonged union time, and locked plating may be indicated. The increased cost of locking plates may be justified by their ability to offer more stable and durable fixation in these situations. Locking plates are generally not necessary in patients younger than age 50 years who have healthy bone.

One such recommendation involves using three screws on either side of the fracture, with two screws as near as possible to the fracture. In the humerus and forearm, where torsional forces are more prominent, three or four screws should be used on each side.

Thus, these recommendations may not be universally applicable to the use of stainless steel bicortical screws in osteoporotic bone.

Unicortical screws alone should not be used for diaphyseal fixation.

Failed locking constructs should be analyzed specifically for plate span width, working length, and screw density.

Plate span width : plate length divided by fracture length should be >2 to 3 in comminuted fractures36 and >8 to 10 when a locked plate is used for neutralization of a simple fracture pattern

When long plates are used for neutralization of simple fracture patterns, transverse or short oblique fractures must be adequately compressed to avoid excessive fracture site and plate strain.

Ideally, the screw density (the number of screws divided by the number of plate holes) should be <0.4 to 0.5.38 Deviations from these principles can lead to fixation failure of locking plates.

Treatment of Failed Fixation

Early recognition

Construct at risk is essential.

Adhering to sound biologic and mechanical principles

Surgery to correct fixation failure must be meticulously planned and executed, and several biologic and mechanical factors must be considered.

Biologic Considerations

The most important prerequisite for obtaining sound fracture union following fixation failure is adequate fracture site vascularity. Frequently, the local biology is compromised by traumatic softtissue injury, one or more previous surgical

<u>Poor fracture site vascularity may be indicated by atrophic-appearing fracture radiographs</u>.

Historically, autogenous bone grafting has been the preferred option.

More recently, the Reamer/Irrigator/ Aspirator (RIA; Synthes, West Chester, PA) was developed to harvest intramedullary bone graft. Other forms of biologic enhancement, such as bone marrow aspirate, demineralized bone matrix, platelet-rich plasma, and BMP may be used alone or in combination.

Particular attention should be paid to failure of laterally based plates in the presence of medial comminution. For example, comminuted distal femoral fractures and bicondylar tibial plateau fractures have historically had a high rate of late varus deformity when stabilized with laterally applied standard plates.

Although lateral locking plates may provide adequate fixation in these fracture patterns, supplemental medial fixation may be required, such as placement of an additional medial plate in the distal femur.

Osteoporotic Fracture

Morphologic changes in osteoporotic bone include thinned cortices, decreased trabecular density, and decreased stiffness. Because these changes alter the structural and mechanical properties of bone, associated fractures can be considered to be pathologic.16 Affected patients are usually elderly and may have concomitant impaired balance, vision, and cognition, all of which affect the ability to comply with weightbearing restrictions. These factors have direct implications in planning fracture fixation techniques.

Little is known about the direct effects of osteoporosis on fracture healing; however, experimental models have shown a disturbance in the development of callus strength. To avoid fixation failure in osteoporotic bone, the surgeon should focus on minimizing implant
strain and improving screw holding power. Rigid metal implants are not adapted to the altered biomechanical properties of osteoporotic bone; thus, more flexible fixation methods, such as tension band constructs, antiglide plating, and intramedullary nails, are recommended to minimize the bone-implant interface stresses.

Far cortical contact allows the plate to act as a tension band rather than a pure bridge. In plating osteoporotic fractures, it is particularly important to use a long implant with screws both near to and far from the fracture to minimize stress concentration. Long plates also afford some protection from future fragility fracture along the diaphysis, in a manner similar to that provided by a full-length intramedullary device.

Thinned cortices in osteoporotic bone directly reduce screw holding power by diminishing the length of thread purchase. The effect of varying thread diameter is lost when the mineral density of the bone is <0.4 gm/cm2.51 When possible, the surgeon should place the screws so that they engage cortical bone rather than rely on tenuous fixation in the thinned trabecular bone found in the metaphysis. Novel approaches include use of fibular allograft, filling the intramedullary canal with Kirschner wires to gain an interference fit, and use of endosteal plates to recreate the opposite cortex to decrease the likelihood of implant failure.

Summary

Reasons for fixation failure vary widely and may be multifactorial. In planning subsequent treatment, it is imperative that the surgeon attempt to discern the cause of failure. Contributors to implant failure may include systemic patient comorbidities, local pathology at the fracture site, surgeon technical error, and patient postoperative noncompliance.

Structural and biologic alterations in osteoporotic bone demand adherence to specific principles of plate fixation, including the use of full-length implants, locking constructs, bicortical screws, possible cement augmentation, and stable and accurate fracture reduction.

7.Revision TKR. J Bone Joint Surg Am. 2010;92:1282-1292.

The management of a failed TKA can seem quite daunting to the general orthopaedic surgeon

A systematic evaluation that includes a thorough history and physical examination, radiographs, and appropriate serologic testing, the etiology of the failure can be identified in the vast majority of cases.

Infection must always be considered and ruled out.

The etiology of failure then dictates the appropriate surgical intervention.

Useful adjuncts to the standard surgical exposure for total knee arthroplasty include a copious posteromedial release, the quadriceps snip, the tibial tubercle osteotomy, and the medial femoral peel.

Care must be taken to minimize bone loss during component removal. Modular metal augments have proved to be very useful in the management of bone defects, and constraint should be minimized to the least amount necessary for a stable outcome.

Finally, with the everincreasing prevalence of drug-resistant organisms, strong consideration should always be given to a two-stage revision in the management of infection at the
site of a total knee arthroplasty.

8. The Thoracic backache. Orth Trauma 24:1. 63

Patients with thoracic back pain are proportionately far more likely to have serious spinal pathology than in patients with cervical or lumbar back pain.

Thoracic back pain should therefore always be thought of as a ‘red-flag’. The symptom of thoracic back pain may be the first presenting feature of spinal infection, thoracic disc prolapse or neoplasm.

It is vital that any practicing orthopaedic surgeon is able to make a thorough assessment of this patient group. As in all medical conditions, a good idea of the diagnosis can usually be obtained with a detailed history and examination. In the case of spinal disease further investigations are of vital importance in order to confirm the diagnosis and to demonstrate neural as well as vertebral involvement. Management will vary depending on the aetiology and presentation.

The red flags are important symptoms or examination findings that should alert the doctor to a more serious underlying pathology

Patients who demonstrate red flag signs are proportionately more likely to have a serious cause for their back pain.
Given that thoracic back pain is in itself a ‘red-flag’, a patient presenting with thoracic back pain should be considered to have serious spinal pathology until proven otherwise.

Patients with thoracic pain therefore have to be subjected to a thorough assessment, including a full history and examination. Specific care should be taken to elucidate the presence of other red flags, followed by appropriate investigations before a diagnosis of benign mechanical pain can be made. Several serious conditions may present with an insidious onset that can lull the unwary into a false sense of security. Early diagnosis of these conditions may prevent unnecessary intervention in the form of invasive surgery or alter the long term outcome and survival, e.g. tumours, infections.

Scheuermann's kyphosis

Type 1 is thoracic and produces more deformity than pain.

Type 2 (apprentice's spine) is thoracolumbar and produces more pain than deformity.

There is a wide variation in symptoms reported in the literature. Murray et al.8 reported on the natural history and long term follow-up of Scheuermann's kyphosis. The patients who had Scheuermann's kyphosis had more intense back pain, jobs that tended to have lower requirement for activity, less range of motion of extension of the trunk and less strong extension of the trunk and differential localization of the pain. Also the patients reported little preoccupation with their physical appearance. Normal or above normal pulmonary function was found in patients in whom the kyphosis was less than 100º. Patients in whom the kyphosis was more than 100º and the apex of the curve was in the first to eighth thoracic segments had restrictive lung disease.

Mild scoliosis was common and spondylolisthesis was not observed. They concluded that although patients who have Scheuermann's kyphosis may indeed have some functional limitations, they do not have major interference with their lives.º

Their patients who did not have an operation for the kyphosis, adapted reasonably well to this condition. They recommended that the use of operative treatment for Scheuermann kyphosis

should be carefully reviewed.

9. UKA Failure JANUARY 2010 | Volume 33 • Number 1

Unicondylar arthroplasty has reemerged as an option for isolated compartment knee arthritis. We have noticed an increase in the need for early revision of this construct at our revision center.

This study sought to determine if the need for unicondylar revision has increased over time and what factors may have led to early failure.

Revision total knee arthroplasties (TKAs) performed between 1990 and 1999 (period 1) were compared to TKAs performed between 2000 and 2008 (period 2). The prevalence

of unicondylar revision, time to failure, and reasons for failure were calculated.

Between 1990 and 1999, 425 revision TKAs were performed, 7 of which were uni-revisions

(1.6%). These had been in place an average of 169 months (range, 12.9-478.6 months).

Between 2000 and 2008, 744 revision TKAs were performed, 43 of which were uni-revisions (5.8%). These had been in place an average of only 36 months (range, 4.2-159.5 months).

The dominant reasons for failure in period

1 included poly wear and loosening. Reasons for failure in period

2 were variable but included a number of technical errors.

3. We are concerned that market pressure may have led to inappropriate patient selection and that surgical inexperience with this procedure may have led to the technical problems noted in period

2. Patients should be apprised of the possibility of early revision with this procedure.

Gioe et al15 evaluated _5000 TKAs in a community registry and noted that UKA was 7.2 times as likely to fail compared to an all-polyethylene cemented TKA.

The Norwegian Arthroplasty Registry16 echoed some of these concerns, noting 2 times the revision rate with UKA in their evaluation of 2200 unicondylar knees. TKA patients had a survivorship of 94%, while unicondylar TKA patients had only an 80% survivorship.

In the Australian Registry, results were equally disturbing with regards to UKR. Their 5-year revision rate was 8.9%. If they isolated those patients who were younger than 55, the revision rate increased to 13.3%.

A Mayo Clinic study of _9200 TKAs found a 91% 10-year survival of TKAs, while UKAs had only a 68% survivorship. They found that 6.1% met anatomical qualificationsfor isolated medial compartment arthritis. Of these, only 4.3% met the clinical standards ideal for unicondylar TKA.

In the Swedish registry,9 the effects of volume were noted in a large series of Oxford UKA that had a 20% revision rate at 7 years if the surgeon performed 23 cases a year. If the surgeon performed 23 cases a year, the revision rate was only 7% at 7 years. These early revisions are disturbing because a review of the literature reveals that revision of a unicompartmental TKA is not as successful as a primary TKA.

Barrett and Scott23 reported that only 19 of 29 revisions of unicondylar TKAs to TKAs had good to excellent results (66%).

10. **Vertebroplasty Was Not Effective for Painful Osteoporotic Vertebral Fractures.** *JBJS(American)*. 2010;92:1263.

78 patients with back pain for 12 months, 1 or 2 recent vertebral fractures, and edema or a fracture line, or both, within the vertebral body were enrolled. Exclusion criteria included >2 recent vertebral fractures, spinal cancer, neurologic complications, vertebral collapse of >90%, posterior wall destruction, impingement on the spinal cord, and previous vertebroplasty. Complete data were available at 6 months for 71 patients

(91%).

Intervention:

Patients were allocated to vertebroplasty (n = 38) or a sham procedure (n = 40). For vertebroplasty, a 25-gauge needle was used to infiltrate the skin overlying the pedicle, and a 23-gauge needle was used to infiltrate the periosteum of the posterior lamina. A 13-gauge needle was placed posterolaterally relative to the eye of the pedicle and then was guided into the anterior two-thirds of the fractured vertebral body into which an average of 2.8 mL of polymethylmethacrylate (PMMA) was injected. The sham procedure was identical to the vertebroplasty procedure up to the insertion of the 13-gauge needle to rest on the lamina. The vertebral body was gently tapped, and the smell of PMMA permeated the room.

Main outcome measures:

The primary outcome was the pain score at 3 months on a scale of 1 to 10 (with 0 indicating no pain and 10, maximum imaginable pain; 1.5 was the minimal clinically important difference). Secondary outcomes included quality of life (QOL) measured with use of the 41-item Quality of Life Questionnaire of the European Foundation for Osteoporosis (QUALEFFO) (a scale of 1 to 100, with lower scores indicating better QOL), the Assessment of Quality of Life questionnaire (a scale of 0 to 1, with 1 indicating perfect health), and the European Quality of Life-5 Dimensions scale (a scale of 0 to 1, with 1 indicating perfect health). Other secondary outcomes included scores for pain at rest and at night, and the score on a modified 23-item version of the Roland-Morris Disability Questionnaire (a scale of 0 to 23, with higher scores indicating worse physical functioning).

Main results:

Analysis was by intention to treat. The study had 80% power to show at least a 2.5-unit difference in pain between vertebroplasty and placebo. Overall pain scores at 3 months were not significantly different between patients in the vertebroplasty and placebo groups. QOL measures and physical functioning were also not different between the groups at any follow-up evaluation, except for QUALEFFO scores that favored the placebo group at 1 week

II. Recent Trends: Injuries to the Medial Collateral Ligament and Associated Medial structures. J Bone Joint Surg Am. 2010;92:1266-1280.

1.The superficial medial collateral ligament and other medial knee stabilizers—i.e., the deep medial collateral ligament and the posterior oblique ligament—are the most commonly injured ligamentous structures of the knee.

2. The main structures of the medial aspect of the knee are the proximal and distal divisions of the superficial medial collateral ligament, the meniscofemoral and meniscotibial divisions of the deep medial collateral ligament, and the posterior oblique ligament.

3.Physical examination is the initial method of choice for the diagnosis of medial knee injuries through the application of a valgus load both at full knee extension and between 20º and 30 º of knee flexion.

4.Because nonoperative treatment has a favorable outcome, there is a consensus that it should be the first step in the management of acute isolated grade-III injuries of the medial collateral ligament or such injuries combined with an anterior cruciate ligament tear.

5. If operative treatment is required, an anatomic repair or reconstruction is recommended.

The superficial MCL and other medial knee stabilizers—i.e., the deep MCLand the POL are the most commonly injured ligamentous structures of the knee1-4. The incidence of injuries to these medial knee structures has been reported to be 0.24 per 1000 in the US.

Superficial Medial Collateral Ligament

Is the largest structure of the medial aspect of the knee

This structure consists of one femoral attachment and two tibial attachments

The femoral attachment to be oval and, on the average, 3.2 mm proximal and 4.8 mm posterior to the

medial epicondyle.

2tibial attachments.: The proximal tibial attachment is primarily to soft tissue over the termination of the semimembranosus tendon and is located an average of 12.2 mm distal to the tibial joint line9. The distal tibial attachment of the superficial medial collateral ligament is broad and is directly to bone at an averageof 61.2 mm distal to the tibial joint line; it is located just anterior to the posteromedial crest of the tibia9.

Posterior Oblique Ligament

The posterior oblique ligament is a fibrous extension off the distal aspect of the semimembranosus that blends with and reinforces the posteromedial aspect of the joint capsule,

It consists of three fascial attachments at the knee joint, with the most important portion being the central arm. On the average, the central arm of the posterior oblique ligament attaches on the femur 7.7 mm distal and 2.9 mm anterior to the gastrocnemius tubercle.

Brantigan and Voshell reported an oblique portion of the superficial medial collateral ligament, which is now recognized as the posterior oblique ligament2

More recent authors have noted that the superficial MCL and the POL ligament are separate structures. With the recognition that the femoral attachment of the posterior oblique ligament is located closer to the gastrocnemius tubercle than to the adductor tubercle, much of the above ambiguity has been elucidated9.

Deep Medial Collateral Ligament

The deep medial collateral ligament comprises the thickened medial aspect of the joint capsule that is deep to the superficial medial collateral ligament. It is divided into meniscofemoral and meniscotibial components

The meniscotibial portion, which is much shorter and thicker than the meniscofemoral portion, attaches just distal to the edge of the articular cartilage of the medial tibial plateau, 3.2 mm distal to the medial joint line, and 9.0 mm proximal to the proximal tibial attachment of the superficial medial collateral ligament.

Classification

Grade-I	Presents with localized tenderness/and no laxity
Grade-II	Localized tenderness ; partially torn MCL & POL
Grade-III	Complete disruption and laxity with an applied valgus stress.

Isolated medial knee injuries have also been classified in accordance with the amount of laxity observed at 30º of knee flexion with a valgus applied moment.

Grades 1+, 2+, and 3+ correspond to subjective gapping of the medial joint line of 3 to 5 mm, 6 to 10 mm, and >10 mm when compared with the uninjured, Contralateral side

Stress radiograph

Isolated injury of superficial MCL	Increases in joint gapping of 1.7 mm at 0º and 3.2 mm at 30º of knee flexion*

Complete injury (MCL +POL)	Increases gapping of 6.5 mm at 0º 9.8 mm at 30º of knee flexion

Healing

The superficial MCL reported to have an abundant vascular supply. Healing of this ligamentfollows the classic model of healing

The biological effects of immobilization have also been widely studied in superficial medial collateral ligament injurymodels. In a rabbit model, a reduction of collagen mass and increased collagen degradation were observed after twelve weeks of immobilization

It has been concluded that early motion protocols lead to enhanced healing and improved biomechanical properties of the superficial MCL

Biomechanical studies have shown that the superficial MCL is the primary restraint to valgus laxity of the knee. The biomechanical study suggests that the aim of an operative repair or reconstruction of the superficial medial collateral ligament should be to restore the distinct functions of both divisions by reattaching the two tibial attachments in an attempt to reproduce the overall function of MCL.

The posterior oblique ligament reinforces the posteromedial aspect of the capsule, which courses off the distal aspect of the semimembranosus tendon. From a biomechanical perspective, the POL functions as an internal rotator and valgus stabilizer at between 0º and 30º of knee flexion

The deep medial collateral ligament was also reported to provide restraint against external rotation torque in knees flexed between 30º and 90º.

History

Patients often describe a mechanism of injury involving a contact or noncontact valgus force to the knee.

Pain and swelling along the medial aspect of the knee.

When asked to explain the type of instability: that they feel with activities, individuals with medial knee injuries involving the MCL<POL: side-to-side feeling of instability, especially when they were athletes who performed cutting and pivoting maneuvers.

Localized swelling or ecchymosis

A valgus load applied at 30º and 0º

1. The diagnosis of the injury pattern because when a knee has increased medial joint space

   opening at 30 º of flexion but not at 0 º the POL is most likely still intact.

2. When opens at both position, MCL + POL is ruptured

The anteromedial drawer test, performed by flexing the knee approximately 90 º while externally rotating the foot 10 º to 15 º and applying an anteromedial rotational force to the knee, should also be done to determine if there is a concurrent injury to the posterior oblique ligament and/or the posteromedial aspect of the capsule.

It has also been reported that a complete injury to the medial structures will cause increased external rotation at both 30 º and 90 º of knee flexion, resulting in a positive dial test.

MRI is commonly used to assess

Results of Clinical Series

Nonoperative Treatment

Despite the fact that the medial structures are the most frequently injured knee ligaments, controversy remains concerning their treatment. Historically, treatment of acute medial collateral ligament injuries has focused on nonoperative therapies with early controlled motion and protected weightbearing, and fairly good patient outcomes have been reported

Overall, there is a consensus that nonoperative management should be the first step in the treatment of acute isolated grade-I or II injuries because of a typically acceptable clinical outcome

Acute grade-III medial knee injuries are usually treated with a nonoperative protocol. The initial nonoperative treatment includes control of pain and swelling and possibly the use of a hinged knee brace for six weeks to protect against valgus stress and external rotation.

A protocol including immediate knee range-of-motion exercises, early weight-bearing, and progressive strength training has been reported to produce excellent results and a high rate of return to the prior activity level. It is also important to note that the success of nonoperative treatment of complete tears of the medial knee structures relies on an intact anterior cruciate ligament.

Operative Treatment

A high frequency of combined superficial MCL and POL injuries has been reported in knees with severe acute or chronic valgus instability, signifying the important role of the posterior oblique ligament

in providing static stabilization to the medial side of the knee. Operative techniques for these combined injuries include direct repair of the superficial MCL and POL, primary repair with augmentation , advancement of the tibial insertion site of the superficial medial collateral ligament, pes anserinus transfer, advancement of the superficial medial collateral ligament with pes anserinus transfer.

Our preferred technique for the treatment of complete
medial knee injuries that involve the MCL, POL and deep MCL is an anatomic reconstruction

The technique consists of a reconstruction of the two main structures of the medial side of the knee with use of two separate grafts with four reconstruction tunnels. A single anteromedial incision or three small knee incisions are performed to access the anatomic femoral and tibial attachment points of the superficial medial collateral ligament and the posterior oblique ligament.

The superficial MCL tightened at 30º of knee flexion; The POL is tightened at 0º of knee flexion

Postoperative Rehabilitation

It is essential that motion of the knee be achieved as soon as possible after treatment so that intra-articular adhesions do not develop.

However, the patient is instructed to initiate range-of-motion exercises between 0º and 90º of knee flexion in the first two weeks and simple strengthening exercises while wearing a hinged brace immediately postoperatively.

After the initial six weeks of protected weight-bearing, closedkinetic- chain exercises are permitted for functional strengthening.

Confounding Variables

The so-called Pellegrini-Stieda syndrome is typically diagnosed with the use of anteroposterior plain radiographs and is characterized by intraligamentous calcification in the region of the femoral attachment of the medial collateral ligament caused by the chronic tear of the ligament. T

Another confounding variable is the presence of concurrent injuries, which can obscure the findings of the physical examination. If a primary operative repair or reconstruction is indicated in the presence of multiple-ligament knee injuries, it should be performed concurrently with cruciate ligament reconstruction(s) and shortly after the injury because scar tissue, tissue retraction, and tissue necrosis can develop and reduce the quality of the remaining tendon and of the repair. Also, patients with valgus alignment who need a reconstruction should undergo the procedure promptly because of the higher risk of the reconstruction stretching out if the injury becomes chronic. To prevent fluid extravasation, a diagnostic arthroscopy could be helpful either before or after the initial surgical exposure to identify meniscal tears and the site of the deep medial collateral ligament injury. difficult.

Complete medial knee ligament injuries may not always heal. Operative treatment is usually indicated for chronic medial knee injuries in patients with symptomatic instability, pain, and excessive medial joint gapping.

However, chronic injuries usually require complete reconstruction of the superficial medial collateral and posterior oblique ligaments because of extensive Pericapsular scar formation.

The operative approaches for medial knee repairs and reconstructions predominantly involve an anteromedial incision

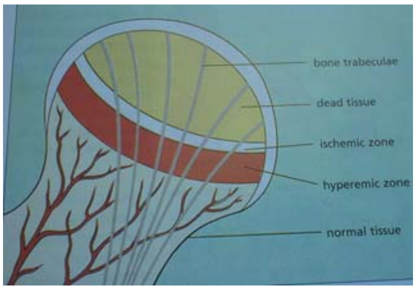
III.Notes: **<u>Osteonecrosis [AVN]</u>**

Osteonecrosis, or bone death, occurs as a result of either impaired blood supply (eg. due to trauma) or severe marrow and bone cell damage.

The hip joint is commonly affected, causing eventual collapse and flattening of the femoral head. Other susceptible sites include the femoral condyles, head of humerus, capitulum, scaphoid, lunate and talus.

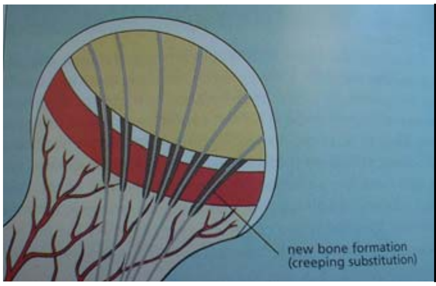
In majority the aetiology of osteonecrosis is uncertain, but various factors have been implicated. It is associated with steroids and heavy alcohol consumption and also with blood dyscrasias (such as Sickle-cell Disease), decompression sickness (Caisson Disease), vasculitis, excessive radiation therapy, and Gaucher’s Disease (abnormal accumulation of glucocerebride in the reticuloendothelial system causes pressure on bone sinusoids, thus necrosis).

b) Pathologic Changes: 4 stages:



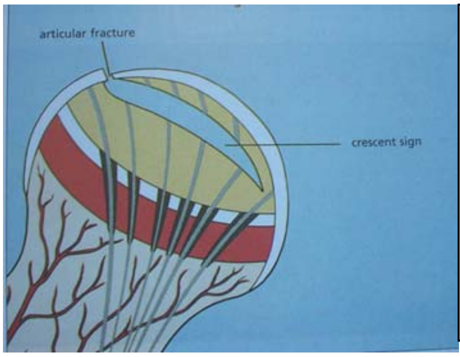
Stage I

- Viable articular cartilage
- Ischaemic zone
- Osteocytic death in the lacunae
- X ray: normal



Stage 2:

- Inflammation occurs, with a vascular reaction.
- New bone is laid down upon the dead trabeculae [Creeping substitute]



Stage 3

- Resorption of necrotic trabeculae
- The bone is weakest during this phase
- Crescent sign
- Fragmentation may occur.

Stage 4

- Articular destruction
- However, severe distortion of the surface eventually results in cartilage destruction.

c) **Evaluation**

Detailed history-taking

In 50% of cases of idiopathic osteonecrosis

Physical examination: range of movement, pain, stiffness

X ray: Early cases may be normal

Later: Sclerosis with lysis

End stage: Collapse and osteoarthritis

MRI

Shows distinctively increased bone density due to reactive new bone formation in the surrounding viable tissue.

Treatment

In stages 1 and 2

- Weight-relief
- Surgical decompression of the bone may prevent bone collapse.

In stage 3 and 4

- Total Hip arthroplasty
- Arthrodesis

IV Free Paper: **FRACTURED NECK OF FEMUR IN THE MOBILE INDEPENDENT ELDERLY PATIENT : SHOULD WE TREAT WITH TOTAL HIP REPLACEMENT?** V.S.Pai MS(Orth), D(Orth), National Board (Orth), M.Ch (Orth); D. Ardern MBChS, N. Wilson MBChS

Aim: To determine the outcome of displaced subcapital neck of femur fractures in the independent elderly (>70 years) managed with total hip arthroplasty through a modified Hardinge approach.

Method: Primary hip arthroplasty was performed for 35 consecutive displaced fractured necks of femur in the Hawke's Bay Regional Hospital between 1998 and 2000. A single surgeon (VSP) using a modified lateral approach operated on them all. Medical charts and outpatient follow-up clinic records were scrutinized for outcomes with particular reference to complications. An independent review was carried out using a questionnaire.

Results: At an average follow up of 1.8 (range 1 to 3) years, no patient needed further surgery. One patient died, giving a mortality rate at one year of 2.9%. All other medical complications were successfully treated. The overall early medical complication rate was 43%. There were no dislocations. Eighty percent had a good clinical outcome at their latest follow up.

Conclusions: The modified lateral approach of Hardinge minimizes the incidence of postoperative dislocation. However, there is a high incidence of medical complications and aggressive treatment of these is necessary, both pre-operatively and post-operatively. The number of pre-existing medical conditions was a significant factor influencing patient morbidity.

INTRODUCTION

The choice of surgical treatment for a displaced intracapsular fracture of the proximal femur in the previously independent elderly patient remains as controversial now as it was almost 50 years ago, and for this reason it has been referred to as “the unsolved fracture”. The goal of treatment of these fractures is restoration of pre-injury function without associated morbidity. The improved functional capacity and greater predictability of total joint replacement prostheses have broadened the indications for joint replacement surgery in displaced femoral neck fractures.

The reported mortality for this fracture is between 14 and 36%[1]. A case fatality study reported a mortality rate of 8% within 35 days and 24% within one year in New Zealand[2]. However, the population of elderly patients with hip fractures is, by nature, a diverse group. Patient subgroups based on age, ambulatory capability, home living environment, and pre-injury co-morbidities including diabetes, heart disease, cerebral dysfunction and visual abilities all differ markedly. There are different mortality rates within the subgroups.

The purpose of this review is to evaluate the functional outcome of fractures of the hip in a group of previously mobile independent elderly patients following a total hip replacement. There is disagreement regarding the treatment of fracture in this subgroup among NZ orthopaedic surgeons[3], it appears that a good outcome can be predicted if the previously mobile independent elderly patient is treated with a total hip replacement[4]. In this study, specific emphasis was placed on the one-year mortality and morbidity, the ability to return to the pre-injury level with regard to independence, walking and performing activities of daily living.

This is a consecutive series of 35 patients who were treated primarily with a total hip replacement by a single surgeon through a modified lateral approach.

MATERIAL & METHODS

Between Jan 1998 and Oct 2000, one surgeon (VSP) performed primary hip replacements in 35 consecutive patients for fractured neck of femur at the Hawke's Bay Regional Hospital, Hastings, New Zealand. Our inclusion criteria were: mobile independent elderly (> 70 yrs), mentally competent (mental test score > 7)[5], displaced fractured neck of femur and those surgeries performed through a modified lateral approach. There were thirty women and five men. The patients had a mean age of 85 (range 70-92) years. Fourteen patients were aged over 85 years.

The mean delay between admission and surgery was 2.5 days. (1-7 days). At the time of admission a major effort was made to schedule all patients for surgical stabilization of the fractured hip as soon as possible. The only patients who were intentionally delayed were those who had an active medical condition that was not well controlled, e.g. diabetes or congestive cardiac failure. Associated medical conditions were involved in the majority of the patients preoperatively: Significant cardiovascular(34%), pulmonary (20%), Metabolic including diabetes, alcoholism, chronic renal failure (30%), Stroke or TIA or Parkinson's (20%). The overall average number of preoperative medical conditions was 1.7 per patient. Fifteen patients had no or minimal medical comorbidity.

Each patient received 24 hours' of prophylactic antibiotics beginning prior to the surgical incision. None received routine anticoagulant therapy. All of the procedures were performed using the Exeter hip system with a 28mm modular head; cemented acetabular and femoral components. The capsule-retaining modified lateral approach of Hardinge[6] was used in all patients under spinal anaesthesia with or without general anaesthesia. This modified approach is different from original Hardinge approach in several ways: 1) Only the anterior third of the gluteus medius is split in line with its muscle fibres 2)The split in the gluteus medius and minimus is limited to 3 cm cephalad to the greater trochanter 3) Hip is exposed through a T shaped incision in the capsule 4) Capsule is retained and repaired 4) Gluteus- vastus flap was sutured to the bone with the 5'0'ethibhond.

Care was taken to orientate the acetabular component in a position of 30 to 40° inclination in the coronal plane and of 15° anteversion in the sagittal plane, whereas the femoral component was oriented at 10° of anteversion. The average blood loss was 250 ml and the average time taken time for the procedure was 70 minutes.

Post-operatively a knee splint was used to keep the knee straight and a pillow between the knees to prevent adduction for a day or two. High risk patients,ASA3 & 4 (Table 2) were transferred to high dependency unit for a period of a day or two and were transferred to the ward only when they were stable. All patients followed a specific occupational and physical therapy protocol that included avoidance of more than 90 degrees' flexion, and hip adduction. These anti-dislocation precautions were maintained for three months post-operatively.

The patients were evaluated at three months and one year. Medical charts and out-patient follow up clinic records were scrutinized (NW) for outcomes with particular reference to complications. The one-year follow-up evaluation was performed with a detailed questionnaire[7] (Table 2) or by telephone interview by an independent examiner (DA).

RESULTS

One patient died on the third post-operative day. All remaining 34 patients were assessed for outcome and complications for a period of at least 12 months or until the patient died. The mean duration of follow-up was 1.8 (range 1-3) years.

Follow-up: Of the thirty-four, six died after the one year follow-up due to causes unrelated to the surgery. These patients were however doing well at their one year follow up. The questionnaire response to remaining 28 patients was 86% (24/28). 4 patients who declined to answer the questionnaire, were further assessed by a telephone interview and all were doing well with regard to pain and mobility although there was some deterioration in their activities daily leaving. A summary of the clinical outcomes is shown in Table 1. The majority had returned close to their pre-injury status with respect to pain, function of walking, and activities of daily living.

Mortality: None of the patients died during the operation. One patient died from a massive stroke three days after the operation and six died due to unrelated causes after a year. The rate of mortality was 2.9% at one year and 20% at two years.

Morbidity: Majority of the patients had at least one significant preoperative medical comorbidity. Surgery was performed after medically stabilizing the patient and the mean delay between admission and surgery was 2.5 days. Postoperative medical complications included: cardiac (6), transient or partial stroke (2), urinary tract infection(5), chest infection (4) and gastrointestinal complications (4).

Most of the complications were minor and responded well to medical treatment. Significant complications included one death due to massive stroke and one partial stroke. One patient had a mild myocardial infarction and two had a gastric bleed. A total of 26 patients (74%) had a completely uneventful operative and post-operative course. Twenty-one complications were seen in 8 patients:1 in ASA 2, 2 in ASA 3, 5 in ASA 4 (Table 2). There were no dislocations, clinical DVT or pulmonary embolism. There was one wound infection, which responded well to washout and antibiotic treatment.

Rehabilitation: The average stay in hospital was 11 days (6-16). Of those patients who lived in their own homes prior to fracture, 83% were able to return home. The remainder were discharged to rest homes.

DISCUSSION

In 1998, Scott et al[3] sent a questionnaire to all orthopaedic specialists in NZ regarding the treatment of fractured neck of femur. The only group in which there was disagreement was in previously independent elderly patients who were mentally sound. The controversy is whether to treat this fracture with a total hip replacement, a hemiarthroplasty or internal fixation. A high failure rate with internal fixation[8,9,10] and a high incidence of acetabular erosion with hemiarthroplasty in patients with high activity levels have been reported[11]. Presently, total hip replacement appears to be the best option[9,11,12,13]. THR is a major intervention and it is logical to expect more complications. However, two prospective studies[9,14] showed no difference between mortality and morbidity among the three different treatments, but total hip arthroplasty resulted in better relief of pain and better function.

Traditionally, the outcomes or results of treatment of femoral neck fractures in elderly patients have been measured by limited standards based on arthroplasty hip scores. The main drawback of the Harris scoring system is that it fails to consider other factors such as medical comorbidities contributing to decreased function. We are aware of only a few studies[1] that have categorized and compared pre-injury and post-injury walking. They emphasized the return of the patient to their pre-injury functional status as the true indicator of successful treatment. When these criteria were used in this study, 79% of patients had minimal or no pain and 82% could walk unlimited or for 30 minutes. Of those from their own homes,83% were able to return home **(Table 1)**

The current overall mortality in elderly patients one year after hip fracture ranges from 14 to 36%[1,15]. Many investigators[1,2] have found that advancing age is associated with increased mortality after fracture of the hip. However in our group, fourteen patients were aged over 85 and were doing well at the one year follow-up.

The one year mortality in this series is 2.9%. The vitality and mental competence of the patients, rather than the age per se, are the two important determinants of low mortality.

Kenzor et al[15]. reported that the presence of four or more medical comorbidities significantly increased the mortality rate. In this series, seventy percent of patients had comorbidities. This may explain the increased incidence of post-operative medical complications **(Table 2).** These complications were detected early and responded well to medical management.

A high incidence of prosthetic dislocation has been reported in fractured neck of femur treated with a total hip replacement[13,16,17]. By contrast, there were no dislocations in this series of relatively fit patients. We feel that good stability of the joint can be achieved following total hip joint replacement with a capsule retaining modified Hardinge approach.

Previous studies[9,12,13,17] showed that, despite a high rate of early complications, the durability of a total hip replacement used for the treatment of acute femoral neck fracture in the elderly was good. The revision rate was below 5% at 10 years. This is in contrast to the findings of Greenough[18], who reported a 49% revision rate in 37 patients followed for a mean of 56 months.

Our results are consistent with other reported series [9,12,14,16,,19,20,21] and indicate that total hip arthroplasty has a definite place in properly selected patients with acute femoral neck fractures. We believe this procedure is best reserved for active elderly patients who have fractures in whom standard internal fixation has a high potential for failure, e.g. the high displaced subcapital fracture, or for patients who have significant pre-existing hip disease. Cost-Benefit analysis of surgical treatment has shown that total hip replacement is the most cost-effective treatment when complication rate, mortality, re-operation rate and function are evaluated during a 2 year post-operative period [22]

This is a small series. However, if the results are duplicated in a larger prospective randomized trial, then it could confirm our belief that the gold standard treatment for displaced subcapital fractures of the femur in previously independent, active elderly patients is primary total hip arthroplasty via the modified Hardinge approach.

REFERENCES:

1..Koval JK, Zuckerman JD. Functional recovery after fracture of the hip. J Bone Joint Surg (Am) 1994: 76A; 751-8

2.Walker N, Norton R, Vander Hoorn S, Rodgers A, MacMahon S, Clark T, Gray H. Mortality after hip fracture: regional variations in New Zealand. N Z Med J 119: 112; 269-71

3. Scott J, Sommerville R, Jeffery K. Treatment of the displaced subcapital fractured neck of femur in New Zealand: A national survey. N Z Orth Association Scientific Meeting; 1-4 October, 1999

4. Beadel G, Rowan R, Brougham D. A prospective study of displaced subcapital femoral neck fractures managed with primary arthroplasty. N Z Orth Association Scientific Meeting; 1-4 October, 1999

5. Ions GK, Stevens J. Prediction of survival inpatients with femoral neck fractures. J Bone Joint Surg(Br) 1987: 69B;384-8.

6.Hardinge K. The direct lateral approach to the hip. J Bone Joint Surg (Br)1982: 64B; 17-20

7.Wright JG, Young NL. The patient-specific Index: Asking patients what they want. J Bone Joint Surge (Am) 1997: 79(A): 974—984

8.Davison JNS, Calder SJ, Anderson GH, Ward G, Jagger C, Harper WM, Gregg PJ. Treatment for displaced intracapsular fracture of the Proximal femur. A prospective randomized trial in patients aged 65 to 79 years. J Bone Joint Surg (Br) 2001: 83 B; 206-12

9.Gebhard JS, Harlan C, Amstutuz HC, Zinar DM, Dorey FJ. A comparison of total hip arthroplasty and hemiarthroplasty for treatment of acute fracture of the femoral neck. Clin Orth 1992;282:123-31

10.Skinner P, Riley D, Ellery J, Beaumont A, Coumine R, Stafighian B. Displaced subcapital fractures of the femur: a prospective randomized comparison of internal fixation, hemiarthroplasty and total hip replacement. Injury 1989: 20: 291-3

11.Philips TW: Thompson Hemiarthroplasty and acetabular erosion. J Bone Joint Surg (Am)1989: 71A; 913-7

12.Delamarter R, Moreland JR: Treatment of acute femoral neck fractures with total hip arthroplasty. Clin Orthop. 1987: 218;68-74

13.Taine WH, Armour PC. Primary total hip replacement of displaced subcapital fractures of the femur. J Bone Joint Surg (Br) 1985: 67B; 214-7

14.Gregory RJH, Wood DJ, Stevens J. Treatment of displaced subcapital femoral fractures with total hip replacement. Injury 1992; 23:168-70

15.Kenzora JE, McCarthy RE, Lowell JD, Sledge CB. Hip fracture mortality: relation to Age, treatment, preoperative illness, time of surgery and complications. Clin Orthop 1984: 186; 45-56

16.Coates RL, Armour PC. Treatment of subcapital femoral fractures by primary total hip replacement. Injury 1980;11:132-5

17.Lee BPH, Berry DJ, Harmsen WS, Sim FH. Total hip arthroplasty for the treatment of an acute fracture of the femoral neck. J Bone Joint Surg (Am) 1998:80A;70-5

18.Greenough CG, Jones JR. Primary total hip replacement for displaced subcapital fracture of the femur. J Bone Joint Surg (Br)1988: 70B; 639-643

19.Sim FH, Stauffer RN. Management of hip fractures by total hip arthroplasty. Clin Orthop 1980; 152:191-7

20.Squires B, Bannister G . Displaced intracapsular neck of femur fractures in mobile independent patients: total hip replacement or hemiarthroplasty? Injury 1999;30(5);345-8.

21.Pun WK, Ip FK, So YC, Chow SP. Treatment of displaced subcapital femoral fractures by primary total hip replacement. J R Coll Surg Edinb 1987: 32;293-7

22.Iorio R, Healy WL, Lemos DW, Appleby D, Lucchesi CA, Saleh KJ. Displaced femoral neck fractures in the elderly. Clin Orth 2000: 383; 229-42

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Table 1:

Patient Questionnaire (n = 24)

	Before	After
1. Living situation	**Before**	**After**
Home	86%	70%
Rest Home	14%	30%
2. Amount of Pain experienced from the hip:		
No / occasional pain		79%
Pain after activity		21%
Severe pain to limit ADL		0
3. Does pain interfere with sleep?		
Yes		13%
4. Need for pain medication because of the hip:		
No or occasional pain relief		91%
Regular Pain relief		9%
5. Ability to walk:		
Unlimited	64%	32%
30 minutes outdoors	32%	50%
Limited indoors	5%	18%
6. Ability to Climb Stairs:		
Normal	65%	24%
Only with aid	35%	67%
Unable	0	9%

7. Use of walking aid:

None	61%	26%
Only for long distances	4%	22%
Dependent on Crutch/walker	34%	52%

8. Ability to put on shoes & socks:

Without any difficulty	87%	52%
Only with difficulty	9%	30%
Unable	4%	17%

9. Ability to drive a car:

Yes	41%	14%
No for reasons other	59%	68%
No: because of hip		18%

10. Ability to do house work

Yes	65%	22%
Only some	26%	57%
Nil	9%	22%

11. Sport or hobbies:

Unrestricted	48%	11%
Modified	33%	61%
Unable	19%	28%

12. Ability to get into & out of a chair:

Normally	88%	54%
With some difficulty	12%	46%

13. Limp: Yes	5%	25%
14. Noticeable limb length	-	10%

Table 2:

Comorbidities Vs. Post-operative Complications

	ASA 1 (n=5)	**ASA 2 (n=10)**	**ASA 3 (n=11)**	**ASA 4 (n=9)**
No. Complications	**4**	**9**	**9**	**4**
Death(at 1 year)	**1**	**-**	**-**	**-**
Medical complications	**-**	**1**	**2**	**5**
1 complication	**-**	**1**	**-**	**-**
2 complications	**-**	**-**	**2**	**1**
3 complications	**-**	**-**	**0**	**2**
4 complications	**-**	**-**	**-**	**2**

ASA (American society of Anesthesiologists)

V. Radiology Quiz

Radiology quiz

Question I

History

A 14-year-old boy complains of dorsolateral foot pain and difficulty when walking on uneven surfaces (Images 1 and 2).

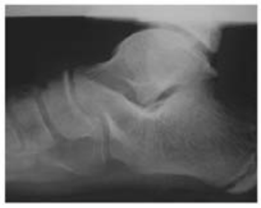


Image 1 Lateral radiograph.

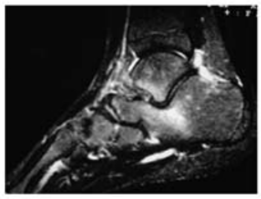


Image 2 MRI (sagittal STIR).

(i) What is the diagnosis?

(ii) What does the MRI show and why?

Answer I

(i) There is complete fusion of the calcaneo-navicular joint representing osseous calcaneo-navicular coalition.

(ii) Increased STIR signal at the site of the coalition represents bone marrow oedema due to stresses secondary to limited joint movement.

Background—tarsal coalition

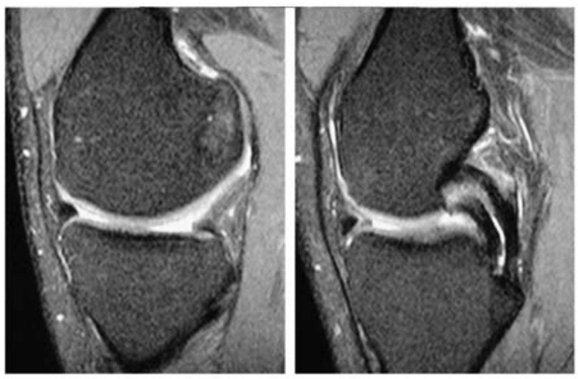
This condition occurs in <1% of the population (bilateral in 50%), and represents failure of segmentation of the tarsal bones. It usually presents in ear[y adolescence as the cartilaginous bar ossifies resulting in the typical rigid flat foot. Symptoms are due to limited motion in the hindfoot, increased stresses elsewhere in the tarsus and often an associated spasm of the peroneal musculature and tendons.

Question 2

History

Patient presents with pain in the knee (Images 3 and 4).

What is the diagnosis?



Images 3 and 4 Magnetic resonance images (proton density with fat saturation).

Answer 2

The posterior portion of the media[meniscus is largely absent consistent with a bucket handle meniscal tear (Image 3). The meniscal fragment is displaced beneath the PCL resulting in a ‘double PCL’ sign (Image 4).

Background—menisci on MRI scans

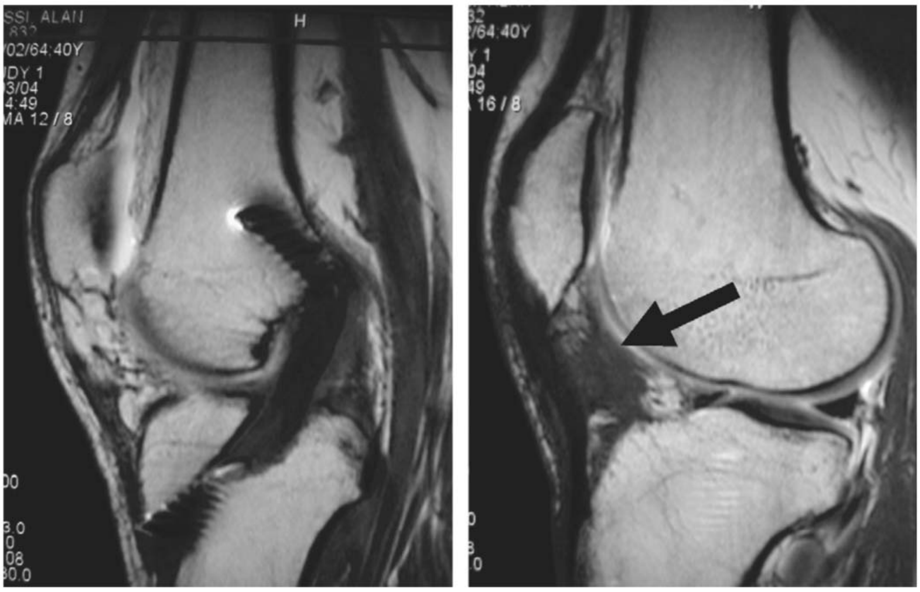
A sagittal slice through the body of a normal meniscus creates a 'bow-tie' configuration which should be seen on at least two consecutive sagittal MR images.
If part of the meniscus is absent ('absent bow-tie' sign), the most likely cause, with the exception of previous surgery, is a bucket hand[e tear and careful inspection is needed to locate the displaced meniscal fragment.

Question 3

History

This patient had post-operative pain on knee extension (Images 5 and 6).

What do the MRI images show?



Images 5 and 6 MRI (sagittal T1).

Answer 3

Image 6 shows the ACL graft is intact, seen as a taut low signal structure.
Fat returns high signal on Ti-weighted images and Hoffa's fat pad will therefore normally contain high signal material. Image 6 shows a rounded low signal mass (black arrow) within Hoffas fat pad which represents post-operative scar tissue; a[so known as arthrofibrosis or a 'Cyclops' lesion.
Background—approach to looking at ACL reconstruction on MRI
i. Graft integrity:
• the graft should be seen as taut intact low signal band,

• there maybe signal up to 2-years post-op periligamentous revascularisation).

2. Position of the femoral tunnel and hence graft isometry (tension):

• AP: 11 o’clock right knee and 1o’clock left knee.

• Lateral: At intersection of posterior femora[cortex & intercondylar roof.

3. Position of the tibia[tunnel and hence signs of impingement:

• the tibia[tunnel should be posterior and parallel to intercondylar roof,

• if it is too steep, graft will impinge on the femur in extension,

• if it is too flat, graft may be too lax.

4. Arthrofibrosis:

• Fibrous tissue seen anterior to the distal graft within notch or Hoffa’s fat pad.

5. Infection:

• Donor site, tunnels, joint.

6. Hardware:

• Bone plug failure.

Question 4

History

8-year-o[d boy presents with pain in the wrist especia[[y at night (Images 7—10).

Describe the appearance of the [esion (b[ack arrow).

What wou[d be the differentia[diagnosis?

Images 7 and 8 AP and lateral radiograph of distal radius/ulna.

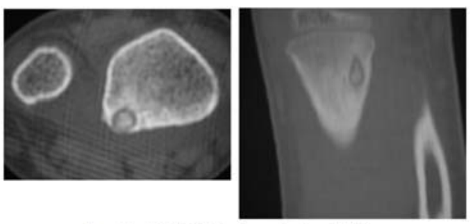


Image 9 and 10 Axial CT and coronal reformat CT slices.

Answer 4

(i) There is a small radiolucent lesion within the medial aspect of the distal radial metaphysis. There is adjacent cortical thickening best appreciated on the latera[view.
(ii) The differential diagnosis on the p[ain radiograph in a child includes osteoid osteoma, Brodie's abscess and eosinophilic granuloma.
The CT scan confirms the diagnosis of an osteoid osteoma by demonstrating a nidus.
Background information—osteoid osteoma
The characteristic clinical picture is pain worse at rest and night, which is typically relieved with salicylates. The radiologica[features are a central nidus (<1 cm) with surrounding sclerosis. The degree of this reactive sclerosis and periosteal new bone formation depends upon the site within bone. It is most marked in a cortical or subperiosteal location.

Question 5
History
A 12-year-o[d boy presents with an increasing hand deformity (Image 11).
Describe the radiograph. What is the diagnosis?

Image 11 Plain AP radiograph.

Answer 5
There are mutiple lytic, expansile, radiolucent lesions involving the metacarpals and phalanges, particularly on the ulnar aspect of the hand. These are consistent with multiple enchondromas. The diagnosis is Ollier's disease.
Background information—Ollier's disease
Ollier's is a non-hereditary generalized disorder of endochondral bone formation. It is often unilateral, both with respect to the side of the body and location within a bone.
The risk of malignant transformation is up to 30%.

Its close relation is Maffuci's syndrome, which combines multip[e enchondromas and soft tissue haemangiomas. The presence of haemangiomas in the soft tissues with calcified phleboliths differentiates this from Ollier's.

Question 6

History

This elderly patient presented with back pain and haematuria (Images 12 and 13).

(i) Can you correlate the pathology in the 2 images?

(ii) What is the diagnosis?

Image 12 Plain AP radiograph. Thoraco-lumbar junction

Image 13 Axial CT slice (through body of L1).

Answer 6

(i) The right T12 and L1 pedicles are absent on the plain radiograph.

(ii) The computerised tomogram image shows a soft tissue mass destroying the right L1 pedicle and a mass arising from the right kidney. The diagnosis is vertebra[metastases from a primary renal cell carcinoma.

Metastases

Metastatic lesions predominate in red marrow containing parts of the skeleton i.e. skull, spine, ribs and pelvis. They are rare beyond the knees and e[bows. Associated pathological fractures are common. They do not cross-joints or disc spaces.

VI Multiple Choice

A.Multiple exostosis which statement is not true

1. Deformity: Valgus in the ankle and knee
2. Forearm: deformity is common 50%. Short distal ulna +/- proximal radial head dislocation +/- Madlung like changes
3. Treatment for the forearm: Osteotomy and lengthen ulna
4. Gene: EXT and AD; 2:10,000
5. **C**hondrosarcoma is more than 5%
6. Vascular 10% and nerve pressure 20%

B.**Symptomatic ABC**

1.Observation

2.Radiation therapy

3.Selective arterial embolization and curettage and bone graft

4.Radical en bloc resection

5.Curettage plus radiation therapy

C. **The most common <u>benign tumor of vertebral bodies</u> is**

1 Osteoid osteoma

2 Osteoblastoma

3 Osteochondroma

4 Giant cell tumor

5 Aneurysmal bone cyst

6 Hemangioma

D. **GCT and lung metastasis**

1.GCT : 1-2%

2.When a giant cell tumor metastasizes to the lungs, the biologic behavior of the lesions can be variable.

3.The overall prognosis is favorable, with 75% to 85% surviving rate.

4.The treatment of the pulmonary metastases depends on the clinical scenario: One to five nodules

Most centers would recommend thoracotomy and removal.

5.Greater than 10 nodules: With large numbers of nodules, there are basically two options - chemotherapy or observation. In some patients, with observation alone, the nodules regress.

6.Generally, in approximately 20% of patients, the disease will progress with either enlargement of the pulmonary disease or spread to other organs.

7. All correct

E. Periosteal chondroma

1.Periosteal chondromas are rare lesions.

2.Over 50% of the time, they are located in the proximal femur.

3.Other locations include the distal femur, proximal tibia, and the hand.

4.Periosteal chondromas have typical radiographic appearances:

5.They are small, usually 3 cm to 5 cm.

6.They sit on the top of the bone in an excavation in the cortex.

7.There is a buttress of periosteal bone on either side of the lesion.

8.About one-third of radiographs show mineralization from within.

F. All of the following histologic features are typical of enchondromas except:

1.Low cellularity

2.Small, round nuclei

3.Lobular architecture

4.Prominent myxoid change

5.Occasional binucleate cells

G. The risk of developing a sarcoma in an enchondroma or an osteochondroma is approximately:

1.Less than 1%

2.3% to 5%

3.5% to 10%

4. 10% to 15%

5.15% to 20%

H.SBC. What is true/

1. Very rarely perforate Growth plate [2%]

2. Always disappears after fracture

3. More than 1/3 of diameter ➔ high risk of fracture

4. contains biologically inert fluid

I. HO following head injury

. Lies between muscles

2, lies within muscles

3. Can differentiate from tumoral calcinosis on x ray

4. Severity of HO correlates with severity of spasticity

5. Commonly around hip, knee, elbow and shoulder in decreasing frequency

6. Scan is +ve before X rays

7. Occurs only in spastic and not in flaccid paralysis

8. Occurs in the spastic side than normal side

9.Frequently discovered at 2 months

Answer 2 is false ;4, 7 = false

J. Fibrous Dysplasia

1. Pathogenesis : G_s mutation ➔ increase Cy AMP ➔ IL6 ➔ increase Osteoclast

2. Involved only cancellous bone and radius is the common side

3. Poly more common than mono

4. X ray: Shepherd crook, Parrot beak [stress #] at the inferior border neck; expansile without any periosteal reaction

5. Monostotic: Pathological # in 50%

6. Mazabraud = POlyostic + intramuscualr myxoma

Albright = polyostotic + precocious puberty [3%]

[A=5; B=3; C=6; D=7; E=1[Proximal Humerus]; F=4;G=1; H=1; I=2,4,7; J=2,4]