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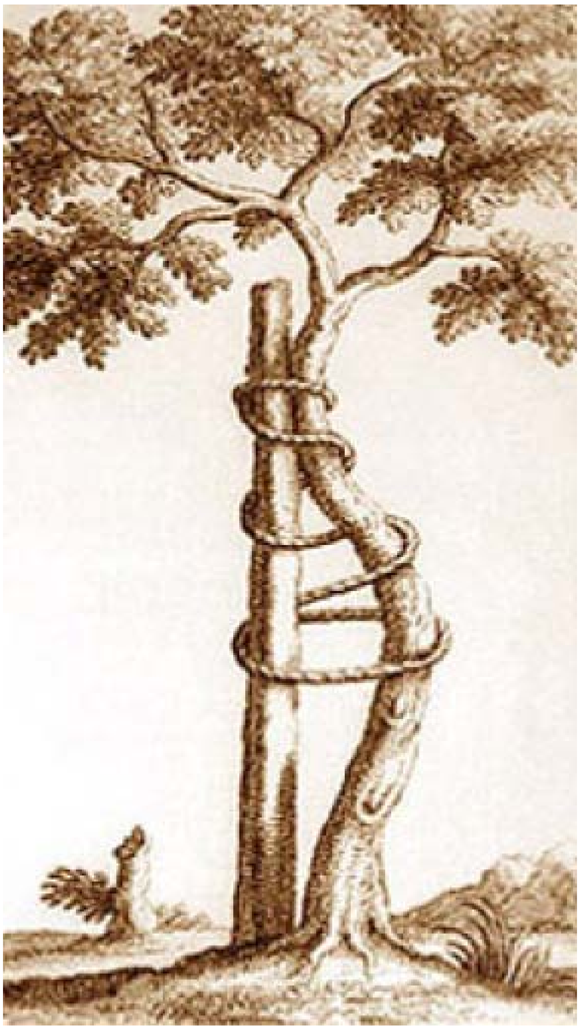

Clinical Journal of Orthopaedic Surgery

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CONTENTS

I Selected papers

1.Early Return to Surgery for Evacuation of a Postoperative Hematoma After Primary Total Knee Arthroplasty. Henry Clarke, Mayo

Introduction

In most patients, the hematoma is small and resorbs without major morbidity5,8. However, a large hematoma may exert enough local pressure to compromise skin viability, cause excessive pain, or lead to persistent drainage. In these circumstances, a return to the operating room for surgical evacuation of the hematoma and wound closure is required4,6

Little is known about the clinical outcomes in patients who require surgical evacuation of an acute hematoma following TKA requiring surgical evacuation.

Methods: 1981 to 2004, 17,784 TKA
42 patients **<u>(0.24%}</u>** returned to the operating room [<30 days]
A case-control study
These patients with 42 control subjects
Subgroup: Only patients who had a hematoma without deep infection below the fascia were included, and this was determined on the basis of preoperative aspiration with negative cultures (four patients), negative cultures at the time of arthrotomy (sixteen patients), or surgeon judgment at the time of evacuation if no cultures had been obtained at any time (twenty-two patients). Surgical treatment of the hematoma included evacuation followed by irrigation and d´ebridement with primary closure.

Two end points

1. Any major surgery following the initial evacuation—specifically, resection arthroplasty, muscle flap coverage, skin grafting, or amputation
2.The development of a deep infection.

Potential risk factors: A history of a coagulation disorder, specifically, hemophilia A or B or von Willebrand disease; a history of deep venous thrombosis or pulmonary embolism in the perioperative period; a history of preoperative anticoagulation requiring perioperative bridging therapy; and a body mass index of >25. In addition, the type of deep venous thrombosis chemoprophylaxis used in the perioperative setting

Results:

<u>2-year cumulative probabilities of undergoing subsequent major surgery (component resection, muscle flap coverage, or amputation) or having a deep infection develop were 12.3%</u> (95% confidence interval, 1.6% to 22.4%) and 10.5% (95%
In contrast, for knees without early hematoma evacuation, the two-year cumulative probabilities were 0.6% (95% confidence interval, 0.5% to 0.7%) and 0.8% (95% confidence interval, 0.6% to 0.9%), respectively ($p < 0.001$ for both outcomes).
A history of a bleeding disorder was identified as having a significant association with the development of a hematoma requiring surgical evacuation ($p = 0.046$).

No significant association, on the basis of the numbers, was found for type of chemoprophylaxis against deep venous thrombosis used in the perioperative setting or a body mass index of >25

Conclusions:

Patients who return to the operating room within thirty days after the index total knee arthroplasty for evacuation of a postoperative hematoma are at significantly increased risk for the development of deep infection and/or undergoing subsequent major surgery. These results support all efforts to minimize the risk of postoperative
of deep infection were calculated for each group.

Discussion

1. The postoperative development of a wound hematoma is a known complication following primary total knee arthroplasty with minor and major bleeding rates reported to occur in 0% to 10% of patients.

Although no hard core evidence: **trends were noted, with aspirin and warfarin appearing** somewhat less likely to be associated with bleeding complications than were LMWH heparin or subcutaneous heparin7

1. A limitation of these findings, however, is the method used to confirm the absence of a deep infection at the time of hematoma evacuation.8. A type-1 error. It is possible that some of these twenty-two **<u>patients had an acute postoperative deep infection that was misdiagnosed.</u>** Therefore the risks of a late deep infection developing after hematoma evacuation have been overstated in this study

2. Another major limitation of this study is that, because it **was not a prospective study**, we were unable to determine the incidence of small hematoma formation and to provide clear directives about when surgical intervention is required.

2.Surgical Management of Hip Fractures: An Evidence-based Review of the Literature. I: Femoral Neck Fractures*J Am Acad Orthop Surg* 2008;16:596-607 Zuckerman

The number of people older than age 65 years is expected to increase from 37.1 million to 77.2 million by the year 2040, and **the rate of hip fractures is expected to double concomitantly**, with an estimated 6.3 million hip fractures predicted worldwide by 2050.2,3 **One year mortality for hip fractures ranges from 14% to 36%,** which is significant, considering the prevalence of such injuries.

Nondisplaced impacted fracture:
Currently, there are no level I or II studies comparing nonsurgical with surgical management of nondisplaced femoral neck fractures.
Nonambulatory patients and patients suffering from severe dementia who have minimal discomfort may also be treated nonsurgically.
Surgical fixation for nondisplaced fractures allows early patient mobilization and ensures that a nondisplaced fracture does not subsequently displace.

Displaced fracture
Internal fixation
28 randomized treated with 19 different pin and/or screw constructs . **None of the implants had significantly superior results for outcomes related to fracture healing, osteonecrosis, wound infection, pain scores, reoperation rate, use of walking aids, periprosthetic fracture, or mortality.**
Four studies noted shorter surgical times with cancellous screws (average, 11 minutes).
Although the overall reoperation rate was equivalent between the groups, failure of fixation was lower in the Sliding hip screw group. There was not a significant difference in mortality between the groups. Based on the available evidence**, there appear to be minimal differences between implants** used for internal fixation of displaced femoral neck fractures

ORIF Vs Hemiarthroplasty
The current data indicate that internal fixation of femoral neck fractures is associated with a greater number of significant problems (eg, osteonecrosis, nonunion, revision) than is hemiarthroplasty.
Eight studies assessed the length of surgery, and all **reported decreased surgical time** for the patients treated with internal fixation (average, 22 minutes). Additionally, the internal fixation group had a more favourable outcome in terms of blood loss, need for postoperative blood transfusions, and infection rates. **No differences between the groups were found regarding mortality rates, pain, or mobility**; however**, there was a higher reoperation rate with internal fixation than with hemiarthroplasty (31% vs 8%;** relative risk, 3.66).
With similar mortality and pain scores, hemiarthroplasty appears to be the better option for displaced femoral neck fractures.
Parker et al17 reported on 455 patients randomized to either internal fixation or hemiarthroplasty and found no differences in outcomes for pain, mobility, or mortality at 3-year follow-up. However, the authors did note a lower rate of revision in the hemiarthroplasty group (5%) than in the group treated with internal fixation (40%).

Cemented Vs Cementless
The conclusion of this review was that **cementing the prosthesis led to reduced pain** postoperatively and better mobility.
Otherwise no statistically significant differences were noted between the groups with regard to postoperative complications, surgical time, estimated blood loss, or mortality.

Khan et al24 **found lower revision rates**, less thigh pain, and better mobility in patients treated with cemented prostheses. There was no difference in general complications or mortality

The recommendations by Dorr et al26 **suggested using a cemented prosthesis** unless the patient exhibits cardiorespiratory compromise. Present trend: cemented THR

Uni Vs Bipolar

A review of the Cochrane database included seven randomized or quasi randomized trials involving 857 patients undergoing unipolar or bipolar hemiarthroplasty for femoral neck fracture. The results **indicated no significant difference in acetabular wear, functional outcomes, length of surgery, blood loss, wound infections, or mortality**.
Raia performed a prospective randomized trial comparing the efficacy of unipolar versus bipolar hemiarthroplasty in 115 patients older than age 65 years with displaced femoral neck fracture. The bipolar endoprosthesis provided no advantage in the treatment of displaced NOF.
The radiologic data suggested that the majority **of motion occurred at the outer articulatio**n (acetabulum-prosthesis interface). There was little, if any, motion at the bipolar interface, which essentially served to convert the bipolar prosthesis to a unipolar device.
The bipolar design was created to reduce acetabular wear as well as to minimize pain and maximize mobility. The review concluded that these outcomes are related to patient activity level and duration of follow up.
There is limited evidence of clinical benefit with a bipolar prosthesis.

Surgical approach
Keene and Parker37 conducted a prospective study of 531 patients who underwent hemiarthroplasty with either an anterior or a posterior approach. **The posterior approach was associated with a higher dislocation rate (4.3% versus 1.7%) and more thromboembolic complications (9.2% versus 1.3%).** Keene and Parker37 conducted a prospective study of 531 patients who underwent hemiarthroplasty with either an anterior or a posterior approach. The anterolateral approach was associated with increased surgical time (8 minutes longer), blood loss (54 mL), and superficial infection (6% versus 2.6%).
There was no difference in hospital stay or mortality, and the authors suggested that **surgeon comfort with the approach should dictate the exposure used**.
The rate of dislocation with a posterior approach was 5.1%, compared with 2.4% for an anterior approach.[Parker]

Internal Fixation Vs THA
Tidermark et al40 conducted a prospective 102 patients with either internal fixation or THA. At 2-year follow-up, the complication rate (36% versus 4%, $P < 0.001$) and **revision rate (42% versus 4%, *P < 0.001) were significantly* higher in the internal fixation group than in patients treated with THA.**

Ravikumar 290 patients > 65 years, comparing internal fixation, hemiarthroplasty, and THA. At 13-year follow-up, revision rates were the lowest (6.75%) and Harris hip scores were the highest (80) in the patients who had undergone THA. The internal fixation and hemiarthroplasty groups had revision rates of 33% and 24%, respectively.

Skinner et al45 also randomized 278 patients to ORIF, hemiarthroplasty, or THA. They showed equivalent mortality at 1 year postoperatively (25%). The internal fixation group exhibited the highest revision rate (25%).

3.Patellar Instability J Bone Joint Surg Am. 2008;90:2751-2762.

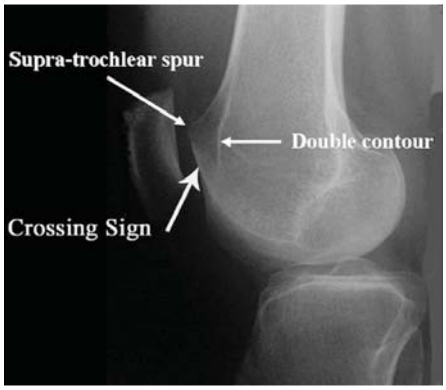
Recurrent patellar instability can result from osseous abnormalities**, such as patella alta, a distance of >20 mm between the tibial tubercle and the trochlear groove, and trochlear dysplasia, or it can result from soft-tissue abnormalities**, such as a torn medial patellofemoral ligament or a weakened vastus medialis obliquus.
Nonoperative treatment includes physical therapy, focusing on strengthening of the gluteal muscles and the vastus medialis obliquus, and patellar taping or bracing.
Acute medial-sided repair may be indicated **when there is an osteochondral fracture** fragment or a retinacular injury.
The recent literature does **not support the use of an isolated lateral release** for the treatment of patellar instability.
A patient with recurrent instability, with or without trochlear dysplasia, who has a normal tibial tubercle-trochlear groove distance and a normal patellar height, may be a candidate for a reconstruction of the medial patellofemoral ligament with autograft or allograft.
Distal realignment procedures are used in patients who have an increased tibial tubercle-trochlear groove distance or patella alta.
The degree of anteriorization, distalization, and/or medialization depends on associated arthrosis of the lateral patellar facet and the presence of patella alta. **Associated medial or proximal patellar chondrosis is a contraindication to distal realignment** because of the potential to overload tissues that have already undergone degeneration.

The incidence of primary patellar dislocation **is 5.8 per 100,000** [4 fold increase between 10-17
The recurrence rate ranges from **15% to 44%**

1. As the patella moves distally with knee flexion, the contact area on the patella moves proximally. In deep knee flexion (120°), the medial facet, or so-called odd facet, contacts the lateral margin of the medial femoral condyle

2.Patella alta results in less osseous stability because the degree of flexion at which the patella engages in the trochlea is higher than that in a normal knee. Under normal conditions, the patella **usually engages by 20° of flexion.**
3. Limb Alignment
The Q angle is largest in full extension because the tibia rotates externally in terminal knee extension (the so-called screw-home mechanism), moving the tibial tuberosity more laterally10.
If the patella is unstable, it subluxates laterally, resulting in a falsely low Q-angle measurement.
Therefore, it is important to keep the patella located in the trochlear groove manually during the measurement.
Limb rotation should also be controlled during measurement since external tibial torsion can increase the apparent Q angle.

Retinacula
The medial patellofemoral ligament is the primary passive soft-tissue restraint to lateral patellar displacement. **It provides 50% to 60% of lateral restraint from 0 to 30°** of knee flexion12.
The medial patellofemoral ligament runs transversely from the proximal half of the medial patellar border to the femur near the medial epicondyle. The superficial fibers of the medial patellofemoral ligament pass over the saddle between the epicondyle and the adductor tubercle and insert 1.9 mm anterior and 3.8 mm distal to the adductor
tubercle.



Radiographic Evaluation
1.The congruence angle 6° ± 11° in the medial direction.
2. The sulcus angle 138° ± 6°.[>145° =trochlear dysplasia
3. The lateral patellofemoral angle [Laurin]
4. Patella alta :The Blackburne-Peel ratio
The Insall-Salvati ratio.
<u>5.Trochlear dysplasia is represented on a perfect lateral radiograph by the so-called crossing sign, a line represented by the deepest part of the trochlear groove crossing the anterior aspect of the condyles (Fig. 1)19. Other radiographic evidence of</u>

trochlear dysplasia on the lateral radiograph is the presence of a supratrochlear spur and a double contour representing a hypoplastic medial condyle.

CT
A distance between the tibial tuberosity and the trochlear **groove exceeding 20 mm** is nearly always associated with patellar instability.

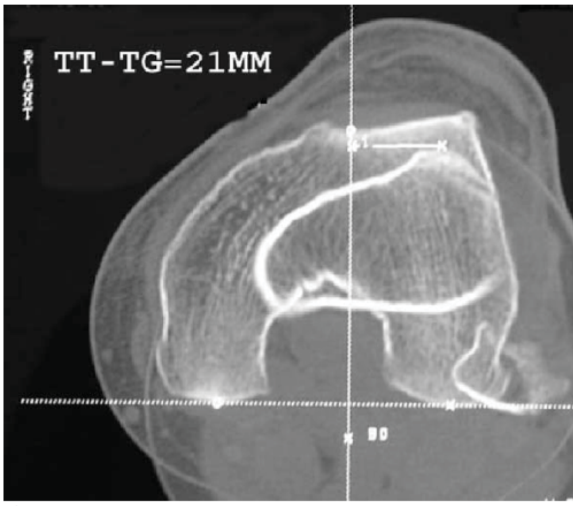


Fig. 3
The tibial tubercle-to-trochlear groove (TT-TG) distance is meas
superimposing axial computed tomography images of the tibi

MRI
1. A cartilage damage or bone bruising of the medial patellar facet and the lateral femoral condyle26.
2. Injury to the vastus medialis obliquus
3. **50% to 80% of injured medial patellofemoral ligaments are disrupted at their femoral origin**

Nonoperative Treatment
No studies have demonstrated the efficacy
The aim of treatment: Promote vastus medialis obliquus and gluteal activity
Immediate mobilization without a brace to cast immobilization in extension for six weeks. mobilization in extension may help the medial structures to heal, but stiffness may be a problem with this treatment.
[Maenpaa] One of three methods: cast immobilization, a posterior splint, or a patellar bandage or brace29.
There was a threefold higher risk of redislocation in patients treated with the patellar bandage or brace. The cast immobilization resulted in a higher rate of stiffness.
Taping has also been shown to increase quadriceps muscle torque .
There is increasing evidence that weight-bearing or closed chain training is more efficacious than open-chain exercises.

Classification of trochlear dysplasia. Type A: crossing sign, with trochlear morphology preserved (fairly shallow trochlea [>145_]). Type B: crossing sign, supratrochlear spur, and flat or convex trochlea. Type C: crossing sign, with double contour. Type D: crossing sign, supratrochlear spur, double contour, asymmetry of trochlear facets, and vertical link between medial and lateral facets (cliff pattern).

Operative Treatment
The so-called **gold-standard treatment for patellar instability has yet to be defined.**
Furthermore, there is a lack of prospective randomized trials.

Lateral Release
shown to be **ineffective for** the treatment of patellar instability.
Although there was an average 80% patient-satisfaction rating in the short term, this rating had dropped to 63.5% after more than four years of follow-up41.

Medial Repair
Nikku: no significant difference between the results of operative and nonoperative treatment with respect to the rate of recurrence of subluxations or dislocations.

Early operative repair to treat an acute patellar dislocation without a loose body was not recommended for athletes at any level by 58% of the surgeons.
The native medial patellofemoral ligament has a load to failure of 208 N52, and a hamstring graft used to reconstruct the medial patellofemoral ligament can generate up to 1600 N43.

Trochleoplasty

Trochleoplasty has been used with equivocal results, as reported in the European literature.
Concerns about **possible serious and irreversible articular and subchondral injury** to the trochlea have limited its use in the US
Indications include abnormal patellar tracking with a J-sign, usually manifested by a tibial tubercle-trochlear groove distance of greater than 10 to 20 mm23, and/or a dome-shaped trochlea noted on a perfect lateral radiograph
Like Verdonk et al.71, Donell et al. Reported several cases that were complicated by postoperative arthrofibrosis.
43% had worsening of preoperative patellofemoral pain.
Concerns about the viability of the articular cartilage
Trochleoplasty may not be the only option for patients with recurrent patellar instability and trochlear dysplasia.

Tibial Tubercle Transfer
A medial transfer of the tibial tubercle (an Elmslie-Trillat procedure) and anteromedialization of the tibial tubercle have both been successful in the treatment of patellar instability.
When the tibial tubercle is transferred anteromedially, the patella engages earlier in flexion and offloads the damaged distal articular cartilage.
Biomechanically, **overmedializing the tubercle (>15 mm** past the original insertion site) can increase contact pressures in the medial patellar facet and medial compartment88.
Nakagawa. performed an Elmslie-Trillat procedure ;at an average of 161 months. Although instability did not increase with time, there were 12% postoperative dislocations
Koeter et a medial transfer, with or without distalization, for patients with either patellar maltracking or patellar instability.
Fulkerson et al. described anteromedialization; decreased on the lateral patellar facet at lower angles of flexion (up to 30°) whereas pressure was equalized between the medial and lateral patellar facets at greater angles of flexion85.
Buuck and Fulkerson reviewed their results: Overall, 74% had a good or excellent result at an average of 8.2 years postoperatively.
Prospective randomized trials are necessary to determine the optimal surgical treatment for chronic patellar instability.

Summary

Acute: recommend nonoperative treatment with patellar bracing and physiotherapy for primary patellar dislocations.

An extensive medial-sided injury
Such as a femoral avulsion of the medial patellofemoral ligament in association with an extensive retinacular injury or avulsion of the vastus medialis obliquus,

Recurrent patellar instability
A reconstruction of the medial patellofemoral ligament or a distal patellar realignment.
Reconstruction of the medial patellofemoral [with or without trochlear dysplasia, who have a normal tibial tubercle-trochlear groove distance and a normal patellar height.

Distal realignment procedures can be used in patients who have an increased tibial tubercle-trochlear groove distance or patella alta. A standardmedialization of the tibial tubercle can be performed if there is a normal patellar height and trochlear anatomy
Distalization of the tubercle can be added if there is concomitant patella alta, and anteromedialization of the tubercle is performed if there is lateral and/or distal patellar facet chondrosis.

4.Long Head of Biceps Clin Sports Med 27 (2008) 747–762

1. 50% of the biceps tendon arose directly from the superior glenoid labrum with varying amounts of posterior to anterior labral contributions, and the remainder of the tendon attaching to the supraglenoid tubercle.

2. It has been found to be approximately 9 cm long from the origin to the musculotendinous junction.

3. The amount of intra-articular tendon varies with arm position, with the maximum intra-articular tendon length of approximately 35 mm occurring with the arm in a position of adduction and extension.

4. It is stabilized proximally by the ‘‘biceps pulley’’ mechanism, composed of the coracohumeral ligament and superior glenohumeral ligament.

5. 76% of the tears were associated with pathology of the long head of the biceps, including all chronic tears.

5. Calderón: Locking plate. J bone joint Surg 90 A: 1297-04

Background: Plate fixation of the distal part of the radius is believed to improve wrist motion by allowing earlier exercises. We performed a clinical trial comparing mobilization of the wrist joint within two weeks (early motion) or at six weeks (late motion) after volar plate fixation of a fracture of the distal part of the radius in order to test the null hypothesis that there are no differences in the flexion-extension arc three and six months after surgery.

Methods: Sixty patients with an isolated fracture of the distal part of the radius that was treated with a single, fixed angle volar plate and screws were enrolled. Thirty patients were randomized to the early motion group, and thirty were randomized to the late motion group. Three and six months after surgery, patients underwent range of motion measurements, grip strength measurements, and radiographic evaluation. The patients also were evaluated according to the modified Gartland and Werley score and the Mayo wrist score, rated pain on a 10-point ordinal scale, and completed the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire.

Results: There were no significant differences between the early motion group and the late motion group with regard to the average flexion-extension arc of the injured wrist at three months (104_ compared with 107_; p = 0.61) or six months (124_ compared with 126_; p = 0.65) after surgery. In secondary analyses, there were no significant differences in terms of selected other motions, grip strength, radiographic parameters, or the Gartland and Werley, Mayo, pain, or DASH scores.

Conclusions: The initiation of wrist exercises six weeks after volar plate fixation of a fracture of the distal part of the radius does not lead to decreased wrist motion compared with the initiation of wrist motion within two weeks after surgery.

6 Cannada:Avoid malalignment in proximal tibial fractures. *J Bone Joint Surg Am.* 2008;90:1760-1768

1. Intramedullary Fixation of Proximal Tibial Fractures: Prone to malalignment, with the prevalence of that complication reported to be as high as 84%

2. The most common type of malalignment is apex-anterior and valgus angulation

3. The position of the knee should be semiflexed to overcome pull by the quad ;

4..The starting point for the intramedullary nail should be lateral [medial to lateral eminence] and proximal

5. Guide wire should be parallel to the anterior cortex: I.I

6. Nail geometry: Tibial nails have a proximal posterior bend (Fig. 1), of up to 14^{o}.

7. The position of the bend in the nail showed that the more proximal the bend of the nail, the lesser the chance for proximal fracture malalignment

8.. Reduce and retain reduction by medial femoral distractor, and/or augmentation of the fixation with a short plate. [Locking 6 holed, medially with unicortical fixation f. Blocking screw [Lateral and Posterior]

7.Wapner.Chronic Achilles problem. J am acad orthop surg 2009:17:1-14

Nonsurgical therapy is the mainstay of treatment for most patients with overuse syndromes. Surgical techniques for overuse syndromes or chronic rupture include débridement, local tissue transfer, augmentation, and synthetic grafts. Local tissue transfer most commonly employs either the flexor hallucis longus or flexor digitorum longus tendon to treat a chronic rupture.

Clancy
Acute (<2 weeks),
Subacute (3-6 weeks)
Chronic (>6 weeks).

Puddu
Pure peritendinitis (stage 1),
Peritendinitis with tendinosis (stage 2),
Tendinosis (stage 3).
Retrocalcaneal bursitis
Insertional tendinoses

With regard to tendinoses, because of diminished vascularity and hypocellularity, the tendon is unlikely to undergo an inflammatory process and has been found histologically to undergo degeneration.

Achilles Peritenonitis
The Achilles tendon is not encased in a true synovial sheath but rather in a single layer of paratenon made up of a single layer of cells. The paratenon is composed of fatty, mesentery-like areolar tissue that is highly vascularized and is responsible for a significant portion of the blood supply to the tendon.
Most of the blood supply to the tendon is anterior. Angiographic studies have revealed that there is an area of tenuous blood supply approximately 2 to 6 cm proximal to the insertion to the calcaneus.11
Paratenonitis is commonly seen in athletes, especially long- and middle distance runners.14 Because of its vascularity, the paratenon is susceptible to inflammation, and the patient with paratenonitis commonly presents with diffuse discomfort and swelling of the tendon.
Acutely, the Achilles tendon may appear sausage like,with fusiform swelling (Figure 4). Tender nodules can often occur within the paratenon, reflecting localized hypertrophy of connective tissue.11
External pressure from poor fitting shoes is thought to cause friction between the Achilles tendon and the overlying paratenon.
A patient with paratenonitis will exhibit tenderness and thickness that remain fixed with active range of motion of the ankle.

Nonoperative
NSAID
+ Moulded AFO
Rarely, surgical treatment is considered for chronic paratenonitis that is resistant to nonsurgical measures.A medial longitudinal incision; The anterior aspect of the paratenon is avoided to protect the blood supply; Thickened paratenon can be excised posteriorly,medially, and laterally around the tendon.15

Achilles Tendinosis
Asymptomatic degeneration of the tendon without inflammation, caused by accumulated microtrauma,aging, or both. Because of its asymptomatic nature, tendinosis is often detected after frank rupture of the tendon.1 Such frank ruptures are often preceded by partial ruptures, typically in middle-aged men who have suddenly increased their level of physical activity.
The paratenon is rarely involved. Central to this pathologic process is the poor healing response following repetitive microtrauma.Although the pathogenesis of tendinosis is unknown, several theories have been proposed, including hypoxic
degeneration, the effect of free radicals, and exercise-induced hyperthermia; however, all of these theories lack direct scientific evidence.

In their series of 109 runners treated conservatively for Achilles tendon overuse injuries, Clement et al9 reported that most **affected runners presented** with a gradual evolution of symptoms, including pain and swelling approximately 2 to 3 cm proximal to the calcaneal insertion.

A feature distinguishing tendinosis from paratenonitis is the mobility of the intratendinous nodule or thickening with the point of maximal tenderness during active range of motion (ie, painful arc sign). On ultrasonography, tendinosis can appear **as a hypoechoic lesion** with or without intratendinous calcification. MRI would also reveal tendon abnormalities, such as tendon thickening on sagittal imaging and altered signal appearance within the tendon tissue3.

As with paratenonitis, and for overuse injuries of the Achilles tendon in general, initial nonsurgical treatment should be directed toward relieving symptoms, correcting training errors in athletes, modifying limb malalignment with orthoses, and improving flexibility.3 Physical therapy, concentrating on enhancing dorsiflexion (ie, eccentric training), is beneficial,
given that most patients with chronic tendinopathy possess limited passive dorsiflexion.

When a patient fails to respond adequately to traditional nonsurgical treatment with NSAIDs, rest, bracing, and physical therapy within a 3- to 6-month period, attention should be directed toward managing the pathology surgically [25%]

Surgical treatment of tendinosis consists of removing the areas of degenerated tendon. The extent of degeneration and the age of the individual can have a profound effect on postoperative outcomes.

It has been recommended that if more than 50% to 75% of the tendon is involved, autogenous tendon transfer, such as with the flexor hallucis longus (FHL) or the flexor digitorum longus (FDL), or even allograft reconstruction should be done.

Hartog23 reported 88% good to excellent results with regard to improved function and pain in a series of 26 patients (mean age, 51.3 years) when using an FHL transfer for chronic Achilles tendinosis.

Achilles Paratenonitis With
Tendinosis
ess likely to respond to nonsurgical treatment.
A cardinal sign of this would be a history of transient sharp pain or repeated episodes of sharp pain within the tendon while running.8 Similar to the presentation of paratenonitis, in the acute phase of coexistent tendinitis, swelling and tenderness are usually found in the middle third of the tendon.
The patient with clinical signs of tendinosis with confluent areas of intrasubstance signal changes on MRI is unlikely to respond to nonsurgical treatment. Earlier surgical intervention in these patients may lead to earlier return of function.24
Surgical treatment involves excision of the diseased paratenon along with degenerated tendon.
With débridement provided that <50% of the tendon was involved. When 50% of the tendon is involved, then augmentation consisting of a turndown flap or tendon transfer should be performed.

Retrocalcaneal Bursitis
Is characterized by pain anterior to the Achilles tendon and that involves inflammation of the retrocalcaneal bursa.
Its anterior surface is composed of fibrocartilage; the posterior aspect of the bursa merges with the paratenon of the anterior Achilles tendon.
This condition is often associated with Haglund’s deformity
It is important to distinguish this entity from the condition known as “pump bump.” Pump bump is a generic termthat refers to any prominence in the subcutaneous Achilles tendon area. It can be attributed to an inflammation of the subcutaneous
Achilles tendon bursa caused by an abrasive heel counter or from a bony protrusion.11
NSAIDs and modification of training regimens can also be helpful
When these measures fail, then a short period of immobilization in a short leg walking cast may reduce the acute symptoms. **Corticosteroid injection is contraindicated**
Partial calcaneal ostectomy is a generally successful procedure in this population and can often restore patients totheir original level of activity within 6 months

Insertional Tendinosis

Insertional tendinosis is a true inflammatory process within the tendinous insertion of the Achilles. It is often associated with Haglund deformity and, in athletes, is commonly seen in those doing **aggressive hill running** and interval programs.11
Like retrocalcaneal bursitis, insertional tendinosis causes posterior heel pain, thought to be due to bony impingement from the calcaneus, local bursitis, or both. Differentiating between the conditions that cause posterior heel pain can be difficult
If the tendinosis becomes chronic, the tendon may also become palpably thickened.
Most cases of insertional tendinosis improve with nonsurgical intervention aimed at relieving stress on the tendon insertion (85% to 90%).27 Initial treatment should be guided toward Achilles tendon stretching, with use of a nonarticulated solid molded ankle-foot orthosis, heel-lift orthoses, and physical therapy. Should nonsurgical measures fail, surgical therapy may be necessary.
McGarvey et al27 reported on the use of a central-splitting approach, beginning with a skin incision 2 cm proximal to the Achilles insertion and extending 6 cm distally.The tendon insertion was then incised in its midline, and any calcific or degenerate regions were dissected free and removed. When excess débridement was required (>50% of the tendon insertion), then the plantaris tendon was used
These authors reported an 82% satisfaction rate with this surgery.

Chronic Rupture
Chronic ruptures typically occur 2 to 6 cm above the calcaneal insertion in the vascular watershed area, with extensive scar tissue deposition between the retracted tendon stumps.
If the defect is smaller than 3 cm following débridement and is less than 12 weeks old, then often direct repair can be performed.
However, if the tendon gap is larger than 3 cm (more commonly observed): FHL transfer

Hansen,33 in which the FHL is harvested from the posterior incision,and reported no functional deficit from loss of strength at the first interphalangeal joint.

8. Perilunate dislocation . J Hand Surg 2008: 33A: 1424-32

1. 65% are associated with scaphoid fractures {“greater arc” injuries}
2. High-energy injuries
3.The mechanism of injury is usually wrist hyperextension, often coupled with ulnar deviation.
4. 20% complains of paresthesias within the median nerve distribution.5
5.Treatment
 a. Closed reduction should be attempted emergently in all patients
 b. Surgical stabilization[open] should be performed within a few days of the injury [or urgently if an attempt at closed reduction is not successful.]
  c. Static, nonprogressive median nerve dysfunction may be due to contusion from the initial trauma, not compression due to swelling and haemorrhage in the carpal tunnel
  d. Although a considerable delay between the injury and its treatment worsens the prognosis, the results of treatment may remain acceptable even if surgical treatment is delayed up to 45 days.7 However, after 4 months, salvage procedures may be required.
 The patient should be forewarned that a salvage procedure such as a proximal row carpectomy may be required if the carpus is irreducible.
6. Relevant anatomy:

The lunate remains anchored in its fossa by the strong short radiolunate ligament.
In essence, volar lunate dislocation is simply the end stage of a dorsal perilunate dislocation and not a separate entity.
Volar perilunate dislocations are rare and occur only 3% to 5%

Closed reduction
Complete muscle relaxation is essential, either through general anaesthesia
The arm is hung in 10–15 pounds (4.5– 6.8 kg) of traction for at least 10 minutes using Chinese finger traps
Surgeon’s thumbs is placed over the proximal volar lunate to stabilize it by providing dorsal and distal pressure. This prevents turning a dorsal perilunate dislocation into a volar lunate dislocation or prevents a dislocated lunate from being pushed further volarly. For perilunate dislocations, the wrist is extended to recreate the mechanism of injury. Traction and slow flexion of the wrist, similar to that used for reducing a distal radius fracture, allows the capitate to locate back into its concavity on the distal lunate, usually with a palpable snap.

Open reduction internal fixation is best performed within the first week following injury, after swelling has decreased [<10 days]
Controversy exists on whether to approach these injuries with an isolated dorsal approach or a combined dorsal and volar approach. If a carpal tunnel release is to be performed, or if a volarly dislocated lunate requires open reduction, a volar approach is made. Otherwise, the author prefers an isolated dorsal approach. This is because experience making both approaches has shown that after reduction and fixation of the carpus, the tear of the volar joint capsule is anatomically apposed and suturing the volar ligaments is not mandatory
When reduction not possible: anterior approach and repair this rent after the carpus has been anatomically reduced and stabilized via the dorsal approach.
A standard midline dorsal incision is made, starting just proximal and ulnar to Lister’s tubercle, proceeding distally to the level of the metacarpal bases. The third compartment is entered, and the extensor pollicis longus tendon is retracted radially and may be formally transposed subcutaneously.
The dorsal joint capsule is invariably disrupted, and the dorsal ligaments are often torn.5 If the dorsal intercarpal (DIC) ligament is intact, it may be preserved for a later capsulodesis. If the DIC ligament is torn but the dorsal radiocarpal ligament is intact, it may be preserved with its intact attachment to the triquetrum for use later as a capsulodesis.
If avulsed fractures attached to the scapholunate interosseous ligament (SLIL) or lunotriquetral interosseous ligament (LTIL).
Radial styloid fragments are often avulsion fractures of the volar radiocarpal ligaments, and simple excision of these fragments may lead to radiocarpal instability. Instead, these fragments or the capsule should be repaired back to the radial styloid using cannulated screws or suture anchors.

The scapholunate and lunotriquetral intervals are gently curetted to facilitate the formation of stabilizing scar.
[joysticks are placed]
If the lunate is extremely unstable in its fossa, it is pinned to the distal radius in neutral alignment to stabilize it. However, this is usually not required.
Following ligamentous injury, the scaphoid will be flexed and the triquetrum extended. The joysticks are used to reduce the proximal row. The scaphoid is extended and reduced against the lunate with a towel clip or pointed reduction forceps used to provide compression.
Through these separate incisions, blunt spreading : Guide wires should be drilled The author prefers screw fixation to K-wire fixation because K-wires do not compress the scaphoid and lunate together to protect the SLIL repair during the critical period of ligament healing.
[headless screws]
The author prefers to fix the scaphoid with a radioscaphoid angle of 45° to 55° to avoid overcorrection of the scaphoid
Attention is then turned to repair of the dorsal SLIL.The SLIL is typically detached from the scaphoid’s proximal pole. One or 2 mini bone anchors are placed into the dorsoulnar aspect of the dorsal extra-articular cortex of the proximal scaphoid.

Grip strengthening is begun at 3 months, at which time the wrist is often comfortable enough to engage in most activities of daily living. Sports and heavy labour are restricted for at least 4 to 6 months.2 The screws loosen over time and should be removed at 6 months.
OUTCOMES
Despite optimal management, the prognosis of this injury is relatively poor, and most patients experience a loss of grip strength and motion and also develop radiographic signs of arthritis and carpal collapse. However, these clinical measurements and radiographic changes do not correlate with patient satisfaction or the ability to return to work.2 The major poor prognostic indicators are a delay in treatment greater than 28 to 45 days, open injuries, and persistent carpal malalignment; some authors believe that a strong SLIL repair is the key to a successful long-term result.4 There is no significant difference.
56% developed posttraumatic arthritis by a mean 6.25 years of follow-up and almost all patients developed midcarpal and/or radiocarpal arthritis by a mean 8-year follow-up. The occurrence of radiographic arthritis
Although a normal wrist is virtually impossible to achieve following these injuries, a favourable outcome with a high level of patient satisfaction can be accomplished.
In Melone’s series, 95% (40/42) returned to their preinjury activities, albeit with some modification; all athletes returned to their former levels of competition. However, sports and heavy labour are rarely possible before 6 months, and usually require 12 months of continuous rehabilitation

9.Bevan.Radiographic Measures as a Predictor of Ulcer Formation in Diabetic Charcot Midfoot Foot & Ankle Internationa:2008;. 29:569-73

Plantar midfoot ulceration in diabetic patients with midfoot Charcot neuroarthropathy is a risk factor for infection that can require amputation. The aim of this study was to determine a simple radiographic predictor of the individual risk of subsequent ulcer formation in this group of patients. *Materials and Methods:* A retrospective review of all patients seen at our institution between January 1998 and July 2004 with diabetic Charcot neuroarthropathy was performed. Exclusion criteria were previous reconstructive foot surgery, absence of weightbearing foot radiographs and absent pedal pulses. Patient charts were reviewed for demographics, diabetic co-morbidities, and presence of midfoot skin pathology (plantar callus and/or ulceration). Weightbearing anteroposterior and lateral radiographs were assessed using standard measurements.
Results: Nineteen patients with radiographs of 24 feet were included. Fifty-eight percent were female, and the mean age was 54 (SD ± 13) years. Ninetyfive percent had type II diabetes mellitus, and the median duration of illness was 20 (range, 14 to 25) years. Midfoot ulceration and callus formation were seen in 6 (25%) and 2 feet, respectively. When radiographic measures of feet with and without midfoot skin pathology were compared, the lateral talar-first metatarsal angle was significantly associated with skin pathology ($p < 0.001$). *Conclusion:* The lateral talar-first metatarsal angle measured on weight bearing radiographs is a simple means of monitoring patients' risk of development of midfoot ulceration. Only patients with a lateral talar first metatarsal angle of greater than -27 degrees had an ulcer. This may be a clinically useful threshold for increased risk of the development of ulceration in midfoot diabetic neuroarthropathy.

Previous studies have examined different risk factors for the development of ulceration in the diabetic foot. The Seattle diabetic foot study reported on 1483 lower limbs and found that sensory and autonomic neuropathy, past history of amputation or ulceration, insulin use, Charcot deformity,hammer/claw toe deformities, reduced skin oxygenation or foot perfusion, greater body mass and poor vision were independently related to foot ulcer risk. Thus, providing support for the multifactoral etiology for diabetic foot ulceration

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Cam-type impingement
Insufficient concavity of the femoral head-neck junction anterolaterally. This has been referred to as a pistol grip deformity3 or a head tilt deformity4. As a consequence, this region of the femoral head has an increased radius of curvature that is too large for the tightly congruent acetabulum. The repeated movement of the deformed femoral head in and out of the acetabulum produces shearing of the labrum and the adjacent acetabular cartilage. This damage is consistently seen at the anterosuperior aspect of the acetabular rim. The deformity may be secondary to Legg-Calv´e-Perthes disease 7 or slipped capital femoral epiphysis 8,9; however, the large majority of patients do not have a history of childhood hip problems10.

Pincer-type impingement is
Overcoverage of the femoral head by the acetabulum. This leads to contact of the labrum against the femoral neck during physiological hip motion 11,12. The labrum eventually fails, but damage to the articular cartilage is initially limited to the acetabular rim2.

Diagnosis
1. Groin pain, usually of insidious ; exacerbated by activity.
2. Cam-type impingement most often have the onset of symptoms during their thirties, Men are more commonly affected
3. Pincer-type impingement is more common in females

4. May need: A cross-table lateral view (with the hip in 10_ of internal rotation)
5. Cross over sign [retroverted acetabulum]: retroversion is common in Pincer type
6. Magnetic resonance imaging with gadolinium arthrography

Treatment
a course of nonoperative management, consisting of activity modification, anti-inflammatory medication, and range-of-motion exercises, is advisable in most cases. It is not clear if patients benefit substantially from such a regimen,
1. Surgical dislocation
2. Arthroscopic
3. Pelvic osteotomy
4. Joint replacement

II Free Paper.MINI-INVASIVE TECHNIQUE OF ACHILLES TENDON LENGTHENING.

Vasu Pai MS, D[orth], National board [Orth], FICMR, FRACS, MCh[Orth], James Warbrick-Smith

INTRODUCTION

Many techniques of Achilles lengthening been described for: club foot, cerebral palsy, Acquired flatfoot, diabetic foot.

Basically consists of lengthening of the heel cord or selective lengthening of the gastro fascia. The lengthening of Achilles can be performed by open Z plasty or percutaneous lengthening.

We report a technique of Mini-invasive lengthening of Achilles which has features of both Open and percutaneous lengthening.

Advantages of this modification are:

Controlled lengthening of the tendon

Prevent excessive lengthening

Easy; quicker

Early weight bearing cast can be applied

No skin related problems: scar irritation

Less chance of tendon adhesion to the skin

No chance of sural nerve damage

Early healing as circulation of the tendon is not interfered

TECHNIQUE [Modified White technique[5]]

The patient in prone position, under tourniquet, double skin incisions is made as in Fig 1. The proximal incision is about 2.5 centimetres, six centimetre from the calcaneal tuberosity. The distal incision is 2 centimetres, 1 centimetre proximal to the calcaneal tuberosity]

The tendon sheath is opened and whole width of tendon is elevated with an artery forceps. Now partially tenotomy is performed both proximally and distally. In the proximal part, the lateral half of the tendon is divided and in the distal part medial half of the tendon is divided.

With forceful dorsiflexion of the ankle with knee in extension, the tendon can be stretched and 10° of dorsiflexion is easily achieved. Tendons ends on either side is stitched with a mattress stitch using 1 Vicryl

Wound is closed layers and the ankle is held in a neutral cast for 2 weeks and then in a below knee cast with knee in 10° dorsiflexion for further 6 weeks

DISCUSSION

The gastrocnemius-soleus can be lengthened at either the musculotendinous junction with an elongation at the level of the Achilles tendon through an open or percutaneous approach [1,2,3,4] or aponeurotic recession [6,7,8,9] .

Numerous procedures have been used in the treatment of equinus contracture; it is difficult to compare studies and success rates. The surgical management of ankle equinus is a widely debated topic, and procedure selection is often based on surgeon preference because there is no consensus regarding the superiority of a single procedure.

The recurrence rate in the literature ranges from 0% to 50%, depending on the type of patient and the length of follow-up. Rattey et al. [5] reviewed 57 patients who had 77 open heel cord lengthening. At an average follow-up of 10 years, half of children 3 years old or younger at the time of surgery had a recurrence of deformity compared with no recurrences in children who were at least 6 years old at the time of the initial procedure. They also found that hemiplegic patients were more likely to have recurrences than were diplegic patients, and that recurrences in diplegic were strongly correlated with surgery before age 4 years.

Over lengthening of the gastrocnemius-soleus should be avoided, especially in an ambulatory child, because it can cause weakness in push-off and crouch gait.[10] Because over lengthening is much less common with an aponeurosis recession, many surgeons prefer this in ambulatory children and reserve open Achilles lengthening for patients with severe deformities that cannot be corrected by recession and for non-ambulatory patients.

Several modifications have been reported[11,12]. We report a modified technique of lengthening of the Achilles tendon in cerebral palsy children which has the advantages of both percutaneous and open technique. This technique has several advantages over open procedures and we emphasize the minimally invasive nature of this technique, the low rate of complications and recurrence, and the absence of secondary deformation of the calcaneus since over-lengthening is not compatible with the technique.

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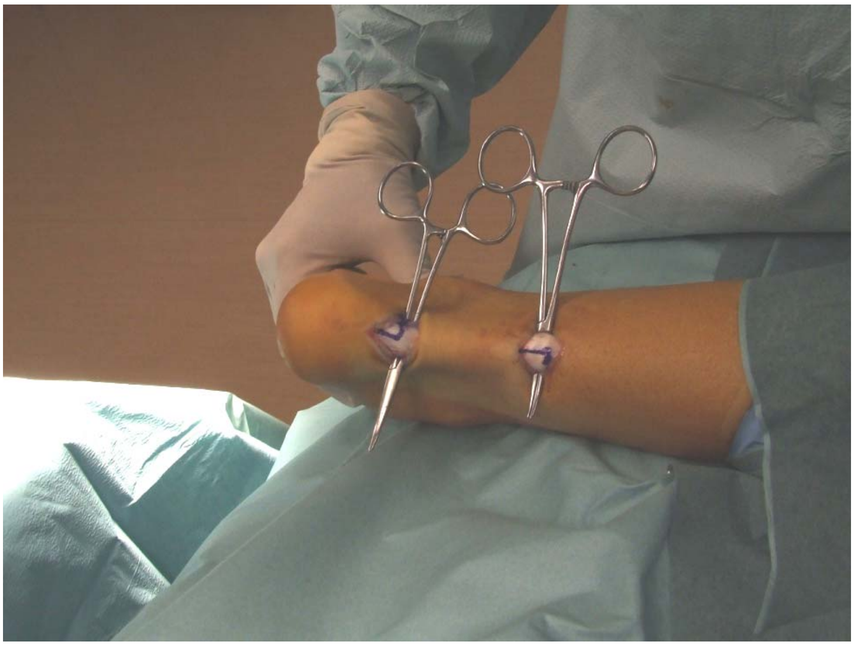


Fig 1: showing proximal and distal skin incision

III Notes on Upper limb congenital anomalies

SWANSON'S CLASSIFICATION

1. Failure of Part formation

Transverse absence:	Congenital amputation
Longitudinal absence:	Radial Club hand
	Ulnar Club hand
	Cleft hand
2. Failure of Part Differentiation	
	Radioulnar synostosis
	Camptodactyly
	Trigger thumb
	Syndactyly
3. Duplication	Polydactyly: Pre-axial, Post-axial
4. Overgrowth	Macrodactyly
5. Undergrowth	Thumb hypoplasia (Blauth)
6. Miscellaneous	Constriction ring syndrome
	Congenital dislocation of radial head
	Madelung's deformity

FACTS

Congenital anomalies affect 1% to 2% of newborns
Approximately 10% of those children have upper-extremity
Genetics

Trisomy of 21, 18, 13	Polydactyly, Syndactyly:
Apert's syndrome	AD

Environmental
Drugs: Talidomide, Dilantin, Warfarin

ASSESSMENT

Initial visit: an emotion filled event.
Underlying guilt.
Parents have difficult for families to accept.
Risk for Future Pregnancies: Genetic counseling

TRANSVERSE AMPUTATION

Part distal is missing.
Rare
Eg: Absence hand at wrist

INTERCALARY AMPUTATION

Segment in between is absent.
More common with Talidomide Intake during pregnancy

RADIAL CLUB HAND

1: 30,000

Bilateral in 60%

Clinical

Absence of radius and radial rays

Bowing of the ulna

Associated — Anal atresia
- Tracheo- oesopharyngeal fistula
- Radial bone absence
- Renal anomalies
- Cardiac anomalies

Treatment

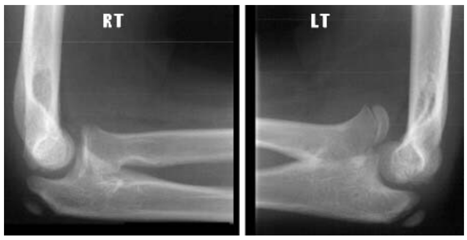
Use of serial casts

Realignment and stabilization: Lower end of ulna is transferred radially.

Tendon transfers - Ulnar side tendons transferred radial side

Correction of the ulnar bowing – osteotomy

RADIO-ULNAR SYNOSTOSES
AD;



Bilateral in 60%

Site: Proximal 1/3 of forearm

Deformity: Forearm pronation

Rx: Leave it alone.

When bilateral: rotational osteotomy in one forearm to a Functional position

TRIGGER THUMB

Often bilateral, with fixed flexion of thumb

If present >1 yrs Rarely recover

Treatment: - Surgery

Release A1 pulley [base of the tendon sheath]

SYNDACTYLY

Syndactyly: Syn = together in Greek

Mnemonic 5,15,50,30:[Thumb and Index 5%; Ring and little: 30%]

More common in white males, AD

Present bilaterally in 50%

Types: I Isolated

II Complex Trisomy 13, 14, 21

Apart syndrome [clinodactyly; facies]

Holt Oram Syndrome [ASD, Radial club hand]

Poland's [Absence of Pectoralis major]

Treatment

Surgery: At 18 months old.

Full-thickness skin grafting is almost always required for soft tissue coverage.

Technique

Mark the skin flaps Z plasty

Dorsal butterfly flap, to make the web

Both sides of the same digit : never separated on the same day (>6 wks)

POLYDACTYLY

POST AXIAL POLYDACTYLY

Post axial [next to the little finger]

Is a common hand anomaly

10 times more in Blacks

AD

Nonsyndromal

PRE AXIAL POLYDACTYLY

Preaxial [next to the thumb]

Is common duplication in whites

AR [17 chromosome]

Syndromal

Treatment

Excise the rudimentary finger

MACRODACTYLY

Hamartomatous enlargement of soft tissue and underlying bone

Associated with neurofibromatosis

When hemi-hypertrophy, suspect

Wilm's tumor

Adrenal carcinoma

Hepatoblastoma

Treatment Debulking,
Osteotomy

Epiphysiodesis

CONSTRICTION RING SYNDROME [CRS]

Also called: Streeter's syndrome

1 in 15,000 live births

The etiology of CRS is unclear

It is not genetic

CRS frequently affects both arms and all four limbs

Commonly associated with clubfoot

Surgical treatment: Z-plasty of constriction

CONGENITAL DISLOCATION OF THE ELBOW

Incidence: 0.16%

D/D

Old Monteggia

Multiple endochondromatosis or exostosis

Radio-ulnar synostosis

Clinical: Family history; Bilateral; anomaly

Loss of supination

Radiological: Hypoplasia of the Capitullum

Dome shaped Head

Treatment: If painful, excision after maturity

MADELUNG'S SYNDROME

Epiphyseal arrest on ulnar and volar half of the distal radius

Joint is directed ulnarward and volarward

AD variable expressivity; Females (4:1)

Wrist motion: Extension and supination are limited

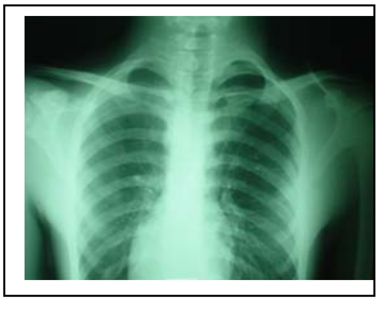
X ray may show: Classical deformity

Inferior Radio-ulnar dislocation

Treatment Corrective osteotomy

Physeal resection and fat graft`

SPRENGEL'S SYNDROME



Failure of the normal caudal migration of the scapula

Associated with Congenital scoliosis

Klippel Fail syndrome

The superomedial scapula is connected to the proximal cervical spinous process through an omovertebral connection (bone, cartilage) in 30%

Treatment: Surgical correction

TORTICOLLES

Associated with other “Molding disorders”

Hip dysplasia

Metatarsus adductus

Plagiocephaly

Treatment Stretching exercise 90% good results

. Surgery if necessary at one yr (Distal or proximal release or both)

Look for Upper cranial anomaly

Ophthalmologic disorder

Posterior fossa brain tumor

KLIPPEL FAIL SYNDROME

Low hair line

Limited ROM of the neck

Can be associated with Sprengle’s shoulder,

Renal or cardiac anomaly

Avoid contact sports

IV InstrControversies and Techniques in the Surgical Management of Patellofemoral Arthritis. William M. Mihalko ***The Journal of Bone and Joint Surgery (American)*. 2007;89:2788-2802**

The patellofemoral joint is a complex articulation that remains a relatively uncommon topic in the orthopaedic literature. Most studies have been of cadavers, and there have been very few in vivo or clinical measurements[1]. The relative lack of interest in the patellofemoral joint is surprising given the fact that patellofemoral symptoms are relatively common and can be extremely debilitating.

Abnormal mechanics of the patellofemoral articulation lead to abnormal pressures on the articular surface, pain, cartilage breakdown, and severe functional limitations secondary to anterior knee pain[2]. An understanding of basic concepts regarding patellofemoral joint kinematics, forces, and contact patterns will enhance the surgeon's understanding of the progression of patellofemoral arthritis. Furthermore, this understanding should ultimately allow the surgeon to choose the appropriate option for each stage of patellofemoral disease.

The patellofemoral joint comprises the patella, the femoral condyles, and the trochlear groove. The patella is a sesamoid bone that acts to redirect the forces of the quadriceps to the distal part of the femur, functioning as a lever arm to increase the efficiency of the extensor mechanism. The femoral condyles have a dual articulation with the medial and lateral facets of the patella[3]. Additionally, almost 75% of people have a third articulating facet on the medial ridge of the patella that articulates with the medial femoral condyle after 120° of flexion[4]. The ridge of the lateral condyle is more prominent than the medial ridge on lateral radiographs of the knee. A deficient lateral condyle may be appreciated on lateral radiographs and may contribute to patellar instability. Between the condyles is the central sulcus, or trochlear groove. The quadriceps and the patellar tendon have a balanced, blended insertion and origin on the patella and generate the majority of forces acting on the patella.

The flexion-extension pathway of the patellofemoral joint is a complex and dynamic cycle. In full extension, the patella does not come into contact with the trochlear groove. As knee flexion is initiated, the inferior pole comes into contact with the trochlea. As knee flexion continues from 0° to 90°, the area of patellofemoral contact moves proximally on the patella, from the inferior pole toward the central portion, and finally toward the superior pole. At 90° of flexion, only the superior region of the patella is in contact with the distal aspect of the trochlear groove[5]. After 120° of flexion, only the most medial and lateral aspects of the patella come into contact with the femoral condyles. The articular cartilage of the patella is the thickest of any in the body, an adaptation to the great pressures throughout the patellofemoral joint during knee flexion[6]. The majority of patellar motion occurs in the sagittal plane with knee flexion.

Joint forces: In early flexion, there is a small compressive force vector on the patellofemoral joint. As flexion increases, so do the compressive forces across the joint. The three major forces acting on the patella include (1) the pull of the quadriceps, (2) the tension in the patellar tendon, and (3) the joint reactive force of the patellofemoral joint. These forces must act through one point in the sagittal plane to be in equilibrium. Unlike a simple lever arm, the patella creates a changing fulcrum position for the quadriceps force. The patellar tendon force is therefore always less than the quadriceps force and is more pronounced in deep flexion. As detailed above, in early flexion this point is in the inferior pole of the patella and in deeper flexion this point moves to the superior pole. Estimates of the forces through the patella range from 1.5 times body weight at 30° of flexion to six times body weight at 90° of flexion. Some authors[6,7] have suggested that contact between the quadriceps tendon and the distal part of the femur helps to dissipate contact forces after 90° of knee flexion.

Patellofemoral contact forces
As the contact point of the patella migrates from the inferior pole in early flexion to the superior pole in deep flexion, the contact surface area increases. There is a steady increase in contact surface area from initial contact in early flexion to about 60°. There are mixed reports regarding the area of patellofemoral contact from 60° to 90°[6]. After 90° of flexion, the reported amounts of contact area have varied, depending on individual anatomy, the amount of force applied by the quadriceps tendon, and the thickness of the articular cartilage. It should also be noted that the quadriceps tendon plays a large role in the transfer of load. Past 90° of flexion, the tendon transfers load to the trochlear groove of the femur, providing more contact as well[8].

History and Physical Examination of Patients with an Arthritic Patellofemoral Joint

Examination of a patient with anterior knee pain begins, like any other medical workup, with a thorough and detailed history. Gathering information such as the duration of discomfort, the location and quality of pain, provocative or palliative factors, and functional limitation is a key portion of the patient evaluation. The summation of these facts will give the orthopaedic surgeon important clues regarding the etiology and diagnosis of the knee pain. Patients with patellofemoral arthritis often present with anterior knee pain, which may radiate medially and/or posteriorly. The pain is often worse with prolonged flexion or when the patient is going downstairs. Knee catching, locking, or giving-way are less specific symptoms that may or may not represent pathological involvement of the patellofemoral joint. The subsequent physical examination will allow the examiner to more accurately differentiate between patellofemoral disorders and other derangements of the knee.

Physical examination of the knee, and particularly the patellofemoral joint, requires both static and dynamic assessment. It has been described as a three-part examination, consisting of standing, sitting, and supine assessments[7,9].

The initial examination begins with the patient standing. Assessment of the stance position and visual gait analysis are important. The axial alignment of the lower extremities should be noted, as abnormalities of the pelvis, femur, or tibia can result in patellofemoral disorders. At the knee, genu varum and valgum alter the mechanics of the patellofemoral articulation. Measurement of the Q angle provides a key piece of information in an evaluation of a patient with knee pain, especially when the patellofemoral articulation is the suspected culprit. Briefly, the Q angle is the angle between two lines, one drawn from the middle of the tibial tubercle to the patella and the other drawn from the patella to the anterior superior iliac spine. The normal Q angle ranges from 10° to 20°[9], but a number of variations have been described. Freeman[10] described a normal Q angle of 10° to 20° in females and 8° to 10° in males. Aglietti et al.[11] described a normal Q angle of 17° in females and 14° in males. Hughston[12] believed that a Q angle of >10° in either gender was abnormal and should be corrected. Despite these variations, large deviations from these ranges are definitely considered relevant. An increased Q angle may lead to an increased valgus force on the patella. This may cause lateral patellar subluxation or tilt and increased compression of the lateral patellar facet. Pelvic geometry is also an important element in the examination, as a widened pelvis may increase the Q angle. The pelvic geometry in women differs slightly from that in men, as women tend to have a wider, gynecoid pelvis. Femoral anteversion may also cause increased knee valgus. This is indirectly indicated by the presence of an inward pointing, or "squinting," patella. To ensure accurate examination of the patella, it is imperative that the patient's feet be pointing forward and aligned. After observation of the axial alignment, gait is assessed. An antalgic, or painful, gait may cause a shortened stance phase of the affected lower limb. This confirms the side of the knee disorder. Limb-length inequality as well as varus or valgus thrust should also be noted if present. Lastly, the patient may be asked to squat and hold that position for a few seconds. This is the half-squat test, and if it recreates anterior knee pain it strongly suggests a patellofemoral etiology.

The second part of the assessment is performed with the patient seated with the legs over the side of the examination table. The lower limbs should be visually inspected first. Thigh muscle girth should be evaluated for bilateral symmetry. Atrophy of the vastus medialis muscles, evidenced by flattening, contributes to patellofemoral symptoms. The anatomic position of the patella should be carefully observed as it may give clues to the cause of pain. Patella alta, or superior displacement of the patella, is common in patients with a patellofemoral disorder, particularly instability. The clinical finding of "grasshopper eyes," in which the patellae are displaced proximally and are externally rotated has been described[10]. Patella alta is radiographically confirmed with use of the Insall-Salvati ratio. Rotational malalignment is assessed by observing the relationship of the superior patellar pole to the inferior patellar pole. Most commonly, the inferior pole is lateral to the superior pole, and deviations from this are important as they may suggest patellar maltracking. Skin depressions medial and lateral to the inferior pole of the patella are normal. Their absence can signify a knee effusion, suggesting an intra- articular disorder as opposed to a patellofemoral disorder. Palpation of the knee is performed next. The important structures to evaluate include the patellar margins, the femoral epicondyles, the tibiofemoral joint line, the Gerdy tubercle, and the fibular head. Tenderness in any one or a combination of these areas may suggest a pathological entity outside of the patellofemoral articulation.

The third portion of the examination requires the patient to lie supine. This position allows a number of tests to be performed to evaluate the forces acting on the patella. The patient is first asked to flex and extend the knee.

Activation of the quadriceps complex permits visual recording of patellar tracking. Normally, in terminal extension, the patella lies laterally within the femoral sulcus. As the knee is flexed past 30°, the patella engages the middle of the femoral sulcus[13]. Lateral subluxation of the patella in terminal extension is known as the "J sign." As the knee is subsequently flexed and extended, the patella may appear to jump in and out of the femoral sulcus. Another test is the active quadriceps pull test[14], in which the knee is extended and the patient is asked to contract the quadriceps muscles. Normally, the patella tracks superiorly in a straight line; lateral deviation of the patella is considered abnormal. To perform the patellofemoral grind test[13], the examiner depresses the patella in the femoral sulcus and then asks the patient to contract the quadriceps. Pain elicited from this test may represent articular injury. To elicit the patellar apprehension sign of Fairbank[15], another indication of patellar instability, the patient is asked to flex the knee to 20° and the examiner then applies a laterally directed force on the patella. At this time, the patient may fear patellar dislocation and instinctively contract the quadriceps and extend the knee to guard against it. The passive patella glide test is performed by flexing the knee 20° to 30°. The examiner then visually divides the patella into three vertical segments, manually displaces the patella medially or laterally, and measures the degree of displacement. If the patella displaces more than three segments laterally, the medial retinaculum is probably incompetent. If the patella displaces less than one segment medially, the lateral retinaculum is tight. Both of these instances predispose the patient to lateral patellar subluxation and resultant pain. For the passive patellar tilt test, the examiner extends the patient's knee and then lifts the lateral edge of the patella away from the lateral femoral condyle. Normally, the patella will lift off slightly from the lateral femoral condyle, representing a positive tilt angle. An inability to lift the patella represents a neutral or negative tilt angle and is consistent with a tight lateral retinaculum.

The physical examination of a patient with anterior knee pain is comprehensive and, when done correctly, can give valuable clues regarding the presence or absence of a patellofemoral disorder. The clues can then be used to determine whether further evaluation is needed.

Nonoperative Management of Patellofemoral Arthritis

Physical therapy that includes quadriceps strengthening has been the cornerstone of nonoperative management. The goal of any strengthening program is to improve the function of the limb while not overloading the damaged patellofemoral articulation. Recently improved understanding of more generalized therapy approaches has shifted focus away from just the patellofemoral joint to overall body balance and stability.

Stretching is a simple modality that may be beneficial in the management of patellofemoral arthritis. The goal of stretching is to restore passive soft-tissue balance of the patella. In most cases, the lateral tissues of the anterior aspect of the knee have become excessively tight. A directed patella- mobilization program focusing on releasing the lateral tissues surrounding the patella may help to decrease excessive pressure on the lateral facet. Although attempts at relaxation of the lateral tissues may ultimately prove unsuccessful, the low morbidity associated with patellar mobilization and capsular stretching makes its inclusion in nonoperative regimens simple.

Strengthening of the vastus medialis obliquus is a classic physical therapy modality for treatment of lateral patellar maltracking. Dysplasia of the vastus medialis obliquus has been reported in patients with problems due to excessive lateral patellar tracking. Most physical therapy regimens involve an attempt to selectively strengthen the vastus medialis obliquus to increase medially directed forces across the patella. Despite the association between dysplasia of the vastus medialis obliquus and patellar maltracking, the utility and success of selective strengthening of the vastus medialis obliquus have not been overwhelmingly supported by the current literature.

Physical therapy ideals have shifted away from a focus on local muscle control and joint function to a focus on limb control and body positioning. In that respect, so-called core strengthening is an excellent approach to the treatment of a patient with patellofemoral arthritis. Core strengthening focuses on abdominal muscle control, trunk balance, and limb control. Exercises designed to improve limb balance focus on the hip and the knee to maximize the efficiency of the limb. In this way, alignment and balance are improved, which hopefully leads to decreased pressures on the patellofemoral articulation and improved function. One key benefit of using core-strengthening principles during rehabilitation is the avoidance of excessive repetitive strengthening exercises about the knee, which may exacerbate symptoms.

The patellar McConnell tape technique can be useful when excessive lateral patellar translation and tilt are part of the clinical presentation. This technique depends on having sufficient mobility remaining in the patellofemoral articulation to medialize the patella passively. A standard taping regimen requires understanding of the taping system, and the skin must be able to withstand multiple applications of adhesive tape.

Several braces have been designed to alleviate anterior knee pain emanating from the patellofemoral joint. Most braces are used in an attempt to drive the patella medially during the knee flexion cycle and offload the lateral facet. The success of these braces is variable and depends on the willingness of patients to reliably apply the brace each day. Some patients may also experience lessening of symptoms as a result of the heat retained by many neoprene knee braces. There are limited clinical data on patellofemoral bracing, but the easy application of such braces makes their use in a nonoperative approach reasonable.

The rigors of land-based therapy may aggravate the problems at the patellofemoral articulation, thereby reducing any potential benefits. In such cases, water exercises may prove helpful. Obese patients may benefit the most from water therapy programs, as joint forces are reduced during these exercise programs. Principles similar to those used during land-based therapy should be emphasized, including global core strengthening focusing on abdominal, hip, and knee balance.

When patellofemoral pain has elements of complex regional pain syndrome (hypersensitivity, burning pain, and pain at rest), aggressive pain management is recommended. Pertinent modalities include desensitization therapy, gabapentin (Neurontin) or pregabapentin (Lyrica), local application of a lidocaine patch, and formal consultation with a pain management specialist.

Surgical Procedures

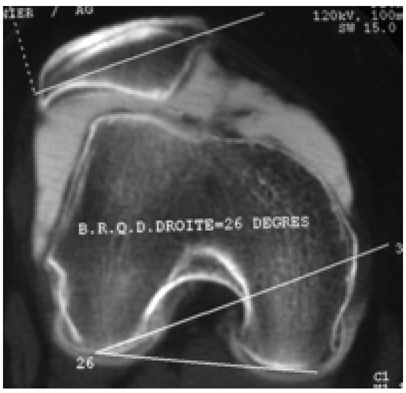
Role of Arthroscopy and Soft-Tissue Realignment

Arthroscopic Débridement

When a patient presents with mechanical symptoms and a loose body is suspected or confirmed on imaging studies, an arthroscopic débridement may be warranted. A chondroplasty may also temporarily relieve discomfort and disability when patellofemoral arthritis is present and associated with swelling, crepitus, and synovitis. Removal of loose cartilage from the patella or femur may limit mechanical irritants as well. The surgeon must realize that these measures may have only temporary effects on symptoms and if underlying mechanical factors have contributed to the progression of the disease they will continue to contribute to the clinical progression of symptoms as well.

Arthroscopic Lateral Retinacular Release

This procedure is frequently utilized and is most effective for treatment of isolated lateral patellar tilt. When clinical and radiographic examinations confirm excessive lateral tilt, lateral facet arthritis may ensue (Fig. 1). Release of the lateral retinacular structures may decrease pressure on the lateral facet and decrease pain. The tight lateral retinaculum should be confirmed on physical examination and by radiographs in a patient for whom conservative measures have failed. The procedure may be useful in patients with lateral facet arthrosis with lateral tilt but no subluxation.



When this procedure is performed, care should be taken not to release the tendinous portion of the vastus lateralis muscle from the superolateral aspect of the patella. This may cause quadriceps weakness and dynamic imbalance. Release of the lateral structures may also improve tracking, but when performed in the face of malalignment the results are less reliable unless concurrent tightening of the medial retinacular structures is performed. Medial imbrication procedures are traditionally utilized for treatment of patellar maltracking, and they may not be appropriate in the face of arthritis of the patellofemoral joint. In the arthritic situation, a medial imbrication may increase forces on the medial facet of the patella and on the medial condyle and lead to overload of the medial aspect of the joint. Lateral release has not been shown to provide long-term benefit for patients with patellofemoral arthritis.

Lateral Patellar Facetectomy

In patients with long-standing patellofemoral disease, excessive lateral tilt and/or translation may lead to the formation of a large lateral osteophyte visible on the Merchant radiograph (Fig. 2). Some authors, including Yercan et al.[16], support excision of the lateral facet overgrowth and retensioning of the lateral tissues. Lateral patellar facetectomy may provide pain relief and decrease the lateral overload in the patellofemoral compartment, but it may decrease bone stock necessary for future replacement.

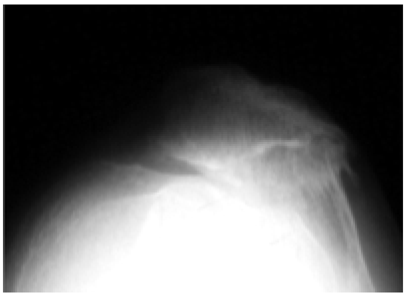


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Fig. 2 A large lateral osteophyte is visible on this Merchant radiograph. This is often a finding in end-stage patellofemoral disease, and it is caused by excessive lateral tilt and/or translation of the patella.

Proximal Soft-Tissue Realignment

Proximal soft-tissue realignment procedures have also been advocated as a way to unload the lateral facet and improve patellar tracking. One of us (J.P.F.) reported limited success with this procedure (a 62% failure rate when signs of degenerative joint disease were present) and believes that other alignment procedures offer more reliable results in patients with patellofemoral arthritis[17].

These procedures are focused on arthritis affecting the lateral facet and have limited utility for patients with more generalized arthritis. In particular, disease of the trochlea or medial facet may lead to an increase in pain following lateral release procedures. For patients with continued symptoms emanating from the lateral aspect of the joint, more aggressive alignment procedures may be required. Soft-tissue realignment procedures alone are also indicated for skeletally immature patients with a history of recurrent dislocations. The mature patient with a high congruence angle and minimal arthrosis may benefit from proximal soft-tissue realignment if therapeutic measures have failed. A Q angle of <10° has also been associated with better outcomes[18].

This technique involves a midline incision from just above the superior pole of the patella to the medial aspect of the tibial tubercle. A release of the lateral patellofemoral ligament and a retinacular release are performed, leaving the synovial tissue intact to isolate the joint. The lower fibers of the vastus lateralis are released as well, and the release is carried down to the level of the tubercle. Medially, the vastus medialis is elevated from the underlying capsule about 10 cm from its insertion. It is then advanced to the lateral free edge of the vastus lateralis, creating a sleeve around the patella. A compression dressing is applied, and knee motion is begun at seven to ten days after the surgery. Insall et al. reported a 91% rate of satisfactory results at four years after use of this procedure[19]. Other techniques involving a lateral release with a medial imbrication have also been described[20]. They involve a similar lateral retinacular release with imbrication of the medial retinacular tissue from the medial aspect of the quadriceps tendon to the proximal aspect of the tibial tubercle. Scuderi et al. reported an 81% rate of good or excellent results after 3.5 years of follow-up[20].

Distal Realignment

Osteotomy for Realignment and/or Resurfacing

Tibial tubercle transfer is recommended for treatment of patellofemoral arthritis in patients in whom unloading of discrete areas of patellar and femoral disease can lead to clinical success. Requisite for this procedure is healthy cartilage onto which patellar loading and tracking can be transferred. Tibial tubercle transfer, when combined with cartilage resurfacing, holds great promise and may reduce the need for early patellofemoral arthroplasty. Through physical and radiographic examinations, the surgeon must first determine which part of the patellofemoral joint is involved in the disease process and thus needs to be unloaded. Radiographs made with the knee in 45° of flexion combined with precise lateral radiographs, magnetic resonance imaging scans, and arthroscopy all help the surgeon to make this determination, and he or she should make sure that all of the imaging studies correlate with the findings on physical examination.

To select the correct osteotomy, one must understand that moving the tibial tubercle anteriorly decreases the flexion of the patella within the trochlear groove and therefore shifts contact on the patella more proximally so that this area is loaded earlier in the flexion arc. The most common areas involved in patients with malalignment are the lateral and distal articular regions[21]. Anterior and medial transfer of the tibial tubercle would thus be appropriate in these patients. It should be realized that dysplasia or atrophy of the quadriceps may also be present in patients with malalignment, and therefore a combined proximal realignment may be necessary[22-24].

There are two main indications for tibial tubercle transfer:

1. The need to realign the patella by establishing proper alignment. (This may also be accomplished with medial imbrication and lateral release, but that "pulls" the patella posteromedially and risks adding excessive load on the medial facet.)
2. When degenerative disease is limited and a realignment osteotomy can unload the affected area. The benefits provided by recent advances in allograft and autograft cartilage resurfacing procedures may also be enhanced by simultaneous tibial tubercle transfer to unload the affected areas.

Relative and absolute contraindications to tubercle transfer include inadequate patient health or obesity, poor bone quality, diffuse patellar or trochlear chondral degeneration, proximal patellar lesions (crush injuries), reflex sympathetic dystrophy or diffuse pain, poor motivation on the part of the patient, and an inadequate trial of nonoperative measures.

Anterior or Elevation Osteotomy of the Tibial Tubercle

This procedure, known as the Maquet osteotomy, is designed to unload the more distal areas of the patella and decrease overall forces within the joint itself. It is particularly effective in younger patients with distal patellar articular degeneration, but it does not address alignment issues in and of themselves. In general, soft-tissue release should be attempted prior to osteotomy. Contraindications include diffuse involvement of the proximal pole regions of the patella.

The technique is performed through a medial parapatellar incision that is extended past the tubercle. The joint, along with the fat pad, is inspected and is débrided to allow mobilization of the tendon. A 2.5 by 5-cm section of iliac crest is then harvested for the procedure. The osteotomy can be performed with use of multiple small drill holes or a thin oscillating saw blade ≥8 cm from the superior aspect of the tubercle distally in the coronal plane. Once mobilized, the proximal segment is displaced anteriorly, allowing plastic deformation of the bone at the distal attachment. The iliac crest graft is then fashioned to allow 1.5 to 2 cm of anteriorization at the tubercle. More than 1.5 cm of anteriorization, however, is associated with a higher prevalence of skin problems postoperatively. If necessary, a cancellous screw can be utilized for supplemental fixation through the tubercle and the graft, into the metaphyseal aspect of the tibia. Postoperative care involves use of crutches and partial weight-bearing and passive motion. Full weight-bearing is allowed at six weeks, when the osteotomy site is usually healed. Maquet reported a 95% rate of successful results in his series[25], but rates as low as 31% have been reported in other series[26] (Fig. 3).

Medial Tibial Tubercle Transfer

This operation, known as the *Elmslie-Trillat procedure*, is a direct medial transfer procedure. It is effective for controlling instability and lateral tracking[27-29]. The operation is mainly indicated for patients with an excessive Q angle, lateral instability, and patellar and/or trochlear cartilage with grade-II or less severe lesions. The procedure is contraindicated for patients with chondral lesions with a grade of greater than II[9], a normal Q angle, or an open proximal tibial physis.

Anteromedial Tibial Tubercle Osteotomy

This osteotomy, known as the *Fulkerson procedure*[16,32], involves the transfer of the tubercle to a more anterior and medial location (Figs. 4-A, 4-B, and 4-C) and is more effective in diminishing or eliminating load on the distal and lateral aspects of the patella[33]. When performing a tibial tubercle transfer, the surgeon should beware of proximal lesions or medial facet or condylar lesions, as transfer procedures will increase load on the proximal part of the patella and on the medial facet and medial condyle. Thus, intact proximal and medial cartilage is required to obtain the maximum benefit from this procedure.

The technique is performed through an incision from the lateral inferior part of the pole of the patella to the anterior ridge of the tibia 5 cm distal to the tubercle. The lateral patellofemoral ligament and the retinaculum are released, leaving the underlying synovium intact. A small arthrotomy is used distally to inspect the joint. The tubercle is then exposed so that a set of drill holes can be made, starting from anteromedial to the tubercle and the tibial ridge and directed posterolaterally. A thin oscillating blade saw can then be used to perform the osteotomy, with angling of the proximal-lateral aspect above the tubercle and leaving the distal bone in continuity with the anterior ridge of the tibia. The tubercle is then moved medially along the osteotomy, plastically deforming the bone attached to the anterior ridge of the tibia. Once the new position of the tubercle is determined, it is fixed with two cortical screws. After the surgery, the knee is immobilized and the patient is allowed partial weight-bearing. Passive range of motion is encouraged, assuming proper fixation. At four to six weeks, when radiographic evidence of healing has occurred, weight-bearing is advanced along with strengthening therapy. Reports have described satisfactory results in more than two-thirds of patients at five years after the surgery[16,32-34].

Anterolateralization of the Tibial Tubercle

This procedure may be a good therapeutic option when there is a medial lesion resulting from over-imbrication during a previous medialization of the tibial tubercle. This lesion may or may not be associated with medial subluxation. Anterolateralization may also be an effective salvage procedure following failed anteriorization of the tibial tubercle. It can help to realign a medially tracking patella, unloading a medial lesion that was overloaded as a result of a previous medial tubercle transfer, and can be selectively combined with resurfacing of the patella. Anterolateralization requires an intact lateral facet.

Autologous Cartilage Resurfacing

Autologous chondrocyte implantation may be indicated for the management of focal chondral defects in the knee of a young patient. The procedure may be considered when an intact joint space has been documented on radiographic examination and the lesion has well-shouldered margins, and when there is no diffuse involvement of the remaining portion of the patella. It is critical that the etiology of the cartilage defect and the underlying abnormal biomechanics of the patella be accurately identified before the decision is made to move forward with this procedure. Having a proper diagnosis as well as correcting the underlying biomechanical abnormalities are paramount for a successful outcome of autologous chondrocyte implantation. The workup for these patients should include a thorough review of the history and a careful physical and radiographic examination of the axial alignment of the lower extremity as well as the patellofemoral joint. A routine series of radiographs, including anteroposterior standing, 45° posteroanterior flexion weight-bearing (Rosenberg), lateral, and skyline (Merchant) radiographs as well as a standing full-length lower-extremity axial alignment radiograph, is made for all patients. When maltracking is suspected on clinical examination, a computed tomography scan should be performed, with the leg in extension. Computed tomography scans are then obtained with and without quadriceps contraction to assess lateral patellar subluxation, the presence of dysplasia of the trochlea, and patellar height. All of these findings are extremely useful in determining the appropriateness of this procedure.

Once a patient is considered a candidate for autologous chondrocyte implantation, arthroscopic examination is performed to assess the geometry of the lesion and any pathological motion of the joint. A cartilage biopsy specimen is also obtained from the non-weight-bearing portion of the superior aspect of the intercondylar notch. This specimen is processed and utilized for cell culture. Approximately 200 to 300 mg of articular cartilage is sent in a sterile transport medium to be commercially cultured and cryopreserved[2,35].

The transplantation procedure is then performed as a second procedure. The chondrocytes are injected beneath a periosteal patch secured with resorbable sutures and fibrin glue[35,36].

The rehabilitation after the surgery includes non-weight-bearing and the use of continuous passive motion for six to eight hours per day for six weeks. The patient is allowed to progress to full weight-bearing by four months after the surgery, but inline impact activities (running) are not permitted for twelve to eighteen months and cutting sports are not allowed for at least eighteen months[35,36].

Minas and Bryant[35] performed a seven-year, prospective cohort study of forty-five patients who had undergone autologous chondrocyte implantation for treatment of full-thickness chondral defects of both the patella and the trochlea, or of one surface of the joint. The average age of the patients at the time of surgery was 36.9 years, and the average duration of follow-up was 47.5 months. The patients were surveyed, and 71% were satisfied with the outcome, 16% were neutral, and 13% were dissatisfied. Eighty-seven percent of the patients said that they would have the surgical procedure again under similar circumstances. Seventy-one percent of the patients rated the result as good to excellent and only 7%, as poor. The Short Form-36 (SF-36), the Knee Society Score, the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and the modified Cincinnati knee score all showed large significant improvements ($p = 0.0016$). Typically, patients started to have pain relief by four to six months after the surgery, and they were allowed to return to non-impact sports activities at nine months postoperatively. Full-impact activities were begun by eighteen months after the surgery. The grafts failed in eight patients (18%). Peterson et al.[36] reported similar results, up to ten years after autologous chondrocyte implantation, regardless of whether patellar maltracking had been addressed at the time of, or corrected prior to, the time of the implantation.

Patellectomy

Patellectomy has been performed for over a century as one of the surgical treatments of severe anterior knee pain[26,37]. Its popularity has waxed and waned over time, with mixed results and opinions regarding its effectiveness. One of us (J.P.F.) found that patellectomy provided adequate pain relief but with permanent loss of knee extensor power[17]. In the end, the results had deteriorated with time in the majority of patients. The operation should be viewed as a salvage procedure, and the surgeon should warn the patient against unrealistic expectations concerning the outcome. Historically, the best results have been noted in patients with severe arthrosis of the patellofemoral joint. The technique basically involves a midline incision with a sharp dissection of the patella. Care should be taken to repair the retinaculum to prevent an extensor lag after surgery, and tracking of the quadriceps tendon should be checked to make sure that a proximal realignment procedure is not necessary. The patient then is allowed early mobilization and weight-bearing after surgery.

Replacement

Patellofemoral Arthroplasty

There has been a recent resurgence of interest in patellofemoral arthroplasty. It has been indicated for end-stage patellofemoral arthritis, when deterioration of the patellofemoral joint is diffuse (Figs. 5-A through 5-E✦✦✦✦). Short-term reports have shown a high level of effectiveness, particularly when alignment issues are corrected[38-40]. Patellofemoral arthroplasty can work well in patients of normal stature with isolated patellofemoral disease and no secondary gain issues.

Isolated patellofemoral arthritis occurs in up to 10% of patients who have osteoarthritis of the knee. Over the years, several different patellofemoral implants have been designed and previous reports of different patellofemoral implants have shown variable results[38]. The Lubinus prosthesis was reported to have a 50% failure rate at eight years in a study of seventy-six cases[39]. The main reasons for failure were malalignment, wear, impingement, and disease progression. The Avon patellofemoral arthroplasty was a second-generation design with features designed to improve alignment and wear[40].

The first Avon patellofemoral implants were placed in September 1996 and entered into a prospective review. Outcomes were assessed with use of pain scores, Bartlett's patella score, and the Oxford knee score. To date, 307 knees have been treated and 159 knees have been reviewed at two to five years postoperatively. The median pain score improved from 15 of 40 points preoperatively to 36 of 40 points at five years. The Bartlett patella score improved from 10 of 30 points to 26 of 30 points at five years. The Oxford knee score improved from 19 of 48 points to 39 of 48 points at five years. Malalignment developed in four knees (1.3%), one of which required distal soft-tissue realignment. There have been no cases of deep infection, fracture, wear, or loosening. Evidence of disease progression developed in eighteen knees (6%), fifteen of which underwent revision to a total knee replacement[40-42].

The technique involves a medial parapatellar approach to the knee and alignment of the anterior femoral resection guide (Fig. 5-C). The alignment of this cutting block is paramount to ensure that no femoral notching or undersizing of the trochlear implant occurs. Most newer designs include an extension of the trochlear implant into the notch of the femur. This area is resected manually with either a template (Avon; Stryker Orthopaedics, Mahwah, New Jersey) or, in some systems, with a template and router (Journey; Smith and Nephew, Memphis, Tennessee). Peg holes are then drilled for the template, and the patella is addressed in the usual total-knee-resurfacing fashion. Care should be taken not to allow excessive overstuffing of ≥4 mm since this may affect postoperative motion. Postoperatively, patients are allowed full weight-bearing and motion is initiated immediately.

Results to date suggest that the improved designs have minimized the previous problems of malalignment and early wear[42]. The functional results are comparable with those of a total knee replacement. Complication rates are low, and there is an excellent postoperative range of motion. Although disease progression remains a potential problem, these prostheses offer a reasonable alternative to total knee replacement in the small group of patients with isolated patellofemoral disease.

Total Joint Arthroplasty

The use of total knee replacement to treat severe isolated patellofemoral arthrosis that is recalcitrant to therapeutic measures has been well established for older patients[43-46]. The procedure is not advocated for younger patients with isolated patellofemoral arthritis, but it can be used with reliable results in patients in their eighth decade of life. Total knee replacement should not be considered until nonoperative management has failed. The exact age at which total knee arthroplasty becomes a viable option for the treatment of patellofemoral arthritis is debatable and case-dependent, but certainly an age younger than fifty-five years should be considered a relative contraindication[46]. Careful adherence to proper techniques and component alignment is well recognized as being crucial to the success of any total knee arthroplasty, and this is no different for patients with patellofemoral arthritis. There are areas that need more emphasis in these patients to ensure a properly aligned knee replacement. Particular attention must be directed toward the correction of extensor mechanism alignment. This is evidenced by the reported rates of retinacular release in these patients, which are as high as 68%[47-49], a threefold increase compared with the rates associated with standard total knee arthroplasty.

Complications involving the extensor mechanism and the patellofemoral joint remain the primary noninfectious indications for revision total knee arthroplasty[50]. Specifically, imbalance of the extensor mechanism and resultant poor patellar tracking are the most common causes of pain after total knee arthroplasty. Patellofemoral complications include patellar subluxation or dislocation; wear, loosening, or failure of the patellar component; and patellar fracture. Component positioning, especially rotational alignment of the femoral and tibial components, is critical to patellofemoral stability. Component malrotation is one of the most frequent causes of patellofemoral complications[51-53].

Any surgical alteration that abnormally increases the tension in the lateral retinaculum or increases the Q angle and produces a laterally directed muscle vector will cause lateral maltracking of the patella and instability of the patellofemoral joint after total knee arthroplasty (Fig. 6). Positioning of the femoral and tibial components is of supreme importance. Valgus angulation of the femoral component will increase the Q angle and produce a laterally directed muscle vector. This alignment error is more common in patients with degenerative arthritis who have a preoperative valgus deformity of >10° combined with loss of bone stock of the distal part of the lateral femoral condyle[53].

Technically, the distal femoral cut should be made perpendicular to the mechanical axis of the limb (6° of valgus angulation with respect to the anatomic axis of the femur)[54]. There are a number of pitfalls to avoid during component positioning. A medially placed prosthesis will cause increased contact stresses between the lateral flange of the femoral component and the lateral border of the patellar component, resulting in patellar subluxation (Fig. 7). The femoral component should be lateralized as much as possible to reduce tension on the lateral retinaculum and reduce shearing stresses placed on the patella.

Component malrotation is the predominant cause of patellofemoral complications in patients with normal axial alignment[51]. The epicondylar axis (a line from the lateral epicondylar prominence to the medial sulcus on the medial epicondyle) is the most reliable guide to ensure correct rotational alignment of the femoral component. The anterior and posterior femoral cuts should be made parallel to the epicondylar axis. Internal rotation of the femoral component with respect to the femur will rotate the trochlear groove medially, increase tension on the lateral retinaculum, and cause lateral patellar maltracking. Erring on the side of slight external rotation should improve patellar component tracking.

Whiteside's line (drawn from the deepest part of the patellar groove anteriorly to the center of the intercondylar notch posteriorly) is another reliable guide for rotational alignment[55]. The anterior and posterior femoral cuts should be made perpendicular to this line. The least reliable landmark for rotational alignment of the femoral component is the posterior condylar line. It is internally rotated relative to the epicondylar axis. If the posterior condylar line is used as a reference, posterior deficiency of the lateral femoral condyle (and valgus deformity) may cause the femoral component to be substantially internally rotated. This will cause lateral patellar maltracking. Studies have demonstrated that a femoral component set parallel to the posterior condylar line is more likely to be malrotated and more likely to require a lateral retinacular release to correct patellar maltracking[56,57]. Internal rotation of the tibial component will also cause patellar maltracking by forcing the tibia into external rotation and increasing the Q angle. The correct placement of the tibial component is rotational alignment of the middle of the component's anterior border with the tibial crest or the medial one-third of the tibial tubercle. The combined amount of internal rotation of the femoral and tibial components is directly proportional to the severity of patellofemoral instability: 1° to 4° should be used when there is lateral tracking and patellar tilting; 3° to 8°, when there is patellar subluxation; and 7° to 17°, when there is early patellar dislocation (at less than two years) or late failure of the patellar prosthesis (at two to six years).

The patellar component should be placed on the medial portion of the patella, mimicking the normal anatomy of a medially oriented sagittal ridge. A laterally placed patellar button will increase the tension in the lateral retinaculum and cause lateral patellar maltracking. A centrally placed patellar component more frequently requires a lateral retinacular release to track normally than does a medially placed component[57].

During patellar preparation, more bone must be removed from the thicker medial facet, with the patellar cut kept parallel to the plane of the medial and lateral poles of the patella. A common mistake involves resection of too much of the lateral facet and too little of the medial facet with a resultant lateral tilt of the patellar component

The current literature seems to favor patellar resurfacing. Multiple studies have demonstrated success with patellar resurfacing, with good relief of pain and good overall outcomes[58-60]. However, other studies have shown success without insertion of a patellar component[61]. Ideally, a patient treated without patellar resurfacing should have no patellar arthritis, and a femoral component that was designed to accommodate the native patella should be utilized.

"Overstuffing" of the patellofemoral joint by using a femoral component that is too large (especially in the anteroposterior dimension) or resecting an inadequate amount of the patella increases tension on the lateral retinaculum[62]. The mismatch of the implant and the resected bone may also increase the circumference of the arc that the quadriceps tendon will travel in flexion and this can affect motion as well. The patellar resection should equal the thickness of the patellar component, while maintaining at least 12 mm of bone to minimize the risk of fracture. The goal should be to maintain the overall thickness of the patellofemoral joint in the anteroposterior dimension.

Alternative surgical approaches such as the subvastus, or "southern," approach potentially offer less disruption of the extensor mechanism, fewer required lateral releases, less patellar maltracking, and preservation of the medial vascular supply to the patella[63]. The technique may be difficult, however, in heavier patients or those with scarring, contractures, or large osteophytes.

Patellofemoral stability may be assessed with use of either the no-thumbs test or the single-suture technique. The patella should track centrally in the trochlear groove without lateral subluxation or lateral tilt through a full range of motion. Ideally, these tests should be performed with the tourniquet deflated, as binding of the extensor mechanism may lead to perceived maltracking of the patellar component. With the no-thumbs test, the knee is taken through the full flexion arc without closing the medial arthrotomy and without applying any medial force with the thumb to keep the patella located. If there is patellar tilting or slight subluxation with the no-thumbs test, the single-suture technique can be used, thus avoiding an unnecessary lateral release. With the single-suture technique, the medial tension vector of the extensor mechanism is simulated by reapproximating the medial retinaculum at the superior pole of the patella with a single number-0 suture. If the suture does not break through a full range of flexion of the knee, then a lateral release is not necessary.

Lateral retinacular release is commonly used to correct maltracking of the extensor mechanism[47]. The tight retinaculum is released approximately 2 cm lateral to the lateral patellar border, with the release extending from the vastus lateralis muscle to the proximal part of the tibia. Care should be taken to preserve the superior lateral geniculate artery. There are numerous possible complications of lateral retinacular release, including substantial vascular compromise (evident on a technetium bone scan), osteonecrosis of the patella, patellar fracture, prolonged wound-healing and wound slough, an increased risk of infection, increased postoperative pain and swelling, and prolonged rehabilitation.

Patellar fracture has even been shown to be more likely after lateral release, whether or not the superior lateral geniculate artery is preserved. Mesh expansion release of the lateral retinaculum is an alternative to traditional retinacular release, with the potential benefit of less disruption to the patellar blood supply.

The results of total knee arthroplasty for the treatment of isolated patellofemoral arthritis have been very good and have included reliable pain relief. However, a high rate of residual postoperative patellar tilt, asymmetrically resurfaced patellae, and residual subluxation has been reported in the literature[46]. These findings emphasize the need to adhere to the technical principles reviewed in this section to properly handle the inherent complexity of these cases. Studies[43-46] have demonstrated good-to-excellent results in terms of pain relief, and these results were superior to those achieved in comparison groups in which total knee arthroplasties had been performed for other conditions. It should be pointed out that anterior knee pain in patients with isolated patellofemoral arthritis was greater than that in patients with tricompartmental arthritis. One may view total knee replacement for arthrosis of an isolated patellofemoral articulation as excessive; however, total knee arthroplasty currently remains the most proven and predictable single procedure for this specific population of older patients with patellofemoral disease[43-46].

Overview

Patellofemoral arthritis is a common cause of anterior knee pain. When the disease is in its early stages, a careful and complete course of nonoperative treatment may provide sufficient pain relief and functional improvement. If surgery is required, limited soft-tissue procedures such as arthroscopic lateral release and débridement may work well if the lateral portion of the joint is primarily affected. Tibial tubercle transfer, particularly anteromedialization, is a powerful way to correct malalignment and offload the lateral and distal parts of the patella. The indications for tibial tubercle transfer may expand if it proves to be a successful adjunct to cartilage resurfacing procedures.

For more severe disease, patellofemoral arthroplasty has evolved into a safe and reliable alternative. When a patient is older or when the arthritis is more diffuse, total knee arthroplasty is a reliable and reproducible way to improve function and decrease pain. Care must be taken to properly position components to avoid problems with the patellar component after the surgery.

V. MCQ

1.Osteoporosis. Gehrig J Bone Joint Surg Am. 2008;90:1362-
1. The National Osteoporosis Foundation recommends a daily calcium intake of 1000 mg/day for men and women under the age of fifty years and 1200 mg/day for men and women over the age of fifty years1
2. A typical American woman consumes approximately 600 mg of calcium through diet
3. Vitamin-D deficiency has been shown to increase the risk of falls by the elderly
4. Beyond the musculoskeletal system, vitamin D influences many other organ systems (the brain, heart, gut, skin, pancreas, and immune system).
5. Approximately 1-15 minutes of sun exposure to the hands and arms two or three days per week is thought to be adequate.
6. Use of sunscreen dramatically reduces vitamin-D3 synthesis [99% eliminated] with a sun protection factor (SPF) of 15
7. Many experts in the field consider t400 IU to be too low and believe that the minimum adult intake should be 800 to 1000 IU daily.
8. Patients to wear hip protectors, which effectively attenuate force from a fall and are associated with >50% reductions in the risk of hip fracture
9.Painful vertebral fractures: Calcitonin-induced analgesia may be mediated by increases in plasma b-endorphins.
10. Raloxifene is association with an increased risk of endometrial cancer preclude its use in the treatment of postmenopausal osteoporosis
11. Alendronate in doses of 70 mg/wk for the treatment of osteoporosis, has been shown to increase bone mineral density in the spine, hip, and femur as well as to reduce the risk of fracture by an average of 50%
12. Osteonecrosis of the jaw, is a troubling potential complication of bisphosphonate use
13. The markers most commonly used bone formation, bonespecific alkaline phosphatase and osteocalcin; and the markers of bone resorption, urine N-telopeptide of collagen cross links (NTx) and serum C-telopeptide of collagen cross links.
14. The limited data currently available indicate that the use of bisphosphonates does not impair, and may actually enhance, fracture-healing

2.**Ceramic. Restrepo The Journal of Arthroplasty Vol. 23 No. 5 2008**
1.Component malposition as a potential cause has been proposed.
2. Squeaking occurred in (2.7%
3.There was no statistically significant difference in cup inclination (P = .25) or version
4.Stripe wear and metal transfer to ceramic components were observed. Etiology of squeaking ceramic total hip arthroplasty 5.Although malposition could be an important contributing factor, the latter cannot be the sole reason
6. The squeaking developed at a mean of 1.3 years (range, 0.6-2.7 years) following THA.

3.Chronic Achillles problem. Foot & Ankle International/Vol. 29, No. 8/August 2008

1.In patients with chronic Achilles tendinopathy, augmentation with flexor hallucis longus (FHL) tendon transfer can be performed to improve pain and functional limitations.
2.All patients had a significant reduction of pain. The operated side had a torque deficit of 35% for plantar flexion.
4. Demonstrates high patient satisfaction without donor site morbidity.
5.Why FHL?
1) FHL provides a tendon which is on average 8 to 10 cm long tendon
2) FHL brings well-vascularised tissue to the critical area of the Achilles
3. Next to the triceps surae complex, the FHL is the strongest plantar flexor
4. Its axis of contractile force most closely aligned to the Achilles tendon.
4) Its neuromuscular activation is a phasic muscle

4.Foot pumps. International Orthopaedics (SICOT) (2008) 32:331–336. Pitto
1. Mechanical prophylaxis with foot pumps provides an interesting alternative to chemical agents in the prevention of DVT

2.The use of foot pumps without GCS does not affect the efficacy of deep vein thrombosis (DVT) prophylaxis and improves patient compliance.
3. Eleven patients of the stocking group (2.7%) and nine patients of the nostocking group (2.3%) developed postoperative symptomatic DVT
4 DVT was more frequent in TKR (10/364; 2.7%) than in THR (10/436; 2.3%).
5.The foot-pump discontinuation rate of patients treated with stockings was 7% versus 4% of the patients treated without stockings ($p<0.05$).
6.In conclusion, management of patients with foot pumps without GCS does not reduce the efficacy of DVT prophylaxis after THR and TKR and improves patient compliance.
7.Following TKR, the effectiveness of foot pumps is less certain [cf THR]
8 The main reason for discontinuation was sleep disturbance at night due to the noise produced by the device.
9.In our study, the discontinuation rate of patients treated with stockings was 7.5%; in contrast, only 4% of patients without stockings terminated the intervention with foot pumps. 10.The average use of the foot pumps was 15.9 h for 5 days.

5.Rim Syndrome
1.Cam-type impingement:The femoral head has an increased radius of curvature that is too large for the tightly congruent acetabulum.
2.Pincer-type impingement is Overcoverage of the femoral head by the acetabulum.
3. Cross over sign [retroverted acetabulum]: retroversion is common in Pincer type
4. Magnetic resonance imaging with gadolinium arthrography is a gold standard
5. Treatment includes arthroscopic, surgical dislocation and osteotomy

6. **Hip Fractures** [J Am Acad Orthop Surg 2008;16:596-607]
1. One year mortality for hip fractures ranges from 14% to 36%, which is significant, considering the prevalence of such injuries.
2.Nondisplaced impacted fracture:Surgical fixation for nondisplaced fractures allows early patient mobilization and ensures that a nondisplaced fracture does not subsequently displace.
3.Displaced fracture: None of the implants had significantly superior results for outcomes related to fracture healing, osteonecrosis, wound infection, pain scores, reoperation rate, use of walking aids, periprosthetic fracture, or mortality.
4.ORIF Vs Hemiarthroplasty:The current data indicate that internal fixation of femoral neck fractures is associated with a greater number of significant problems.A lower rate of revision in the hemiarthroplasty group (5%) than in the group treated with internal fixation (40%).
5.Cemented Vs Cementless
The conclusion of this review was that cementing the prosthesis led to reduced pain postoperatively and better mobility.
6.Uni Vs Bipolar: The results indicated no significant difference in acetabular wear, functional outcomes, length of surgery, blood loss, wound infections, or mortality.
7. The posterior approach was associated with a higher dislocation rate (4.3% versus 1.7%) and more thromboembolic complications (9.2% versus 1.3%).
8.Comparing internal fixation, hemiarthroplasty, and THA. At 13-year follow-up, revision rates were the lowest (6.75%) and Harris hip scores were the highest (80) in the patients who had undergone THA. The internal fixation and hemiarthroplasty groups had revision rates of 33% and 24%, respectively.

7. Perilunate dislocation . J Hand Surg 2008: 33A: 1424-32

1. 65% are associated with scaphoid fractures {“greater arc” injuries}
2. High-energy injuries
3.The mechanism of injury is usually wrist hyperextension, often coupled with ulnar deviation.
4. 20% complains of paresthesias within the median nerve distribution.5
5.Treatment : a. Closed reduction should be attempted emergently in all patients
6. Surgical stabilization[open] should be performed within a few days of the injury [or urgently if an attempt at closed reduction is not successful.

8. Cannada:Avoid malalignment in proximal tibial fractures. ***J Bone Joint Surg Am.*** **2008;90:1760-1768**

1. Intramedullary Fixation of Proximal Tibial Fractures: Prone to malalignment, with the prevalence of that complication reported to be as high as 84%

2. The most common type of malalignment is apex-anterior and valgus angulation
3. The position of the knee should be semiflexed to overcome pull by the quad ;
4..The starting point for the intramedullary nail should be lateral [medial to lateral eminence] and proximal

5. Guide wire should be parallel to the anterior cortex: I.I
6. The position of the bend in the nail showed that the more proximal the bend of the nail, the lesser the chance for proximal fracture malalignment
8.. Reduce and retain reduction by medial femoral distracter, and/or augmentation of the fixation with a short plate. [Locking 6 holed, medially with unicortical fixation f. Blocking screw [Lateral and Posterior]

9.Patellar Instability J Bone Joint Surg Am. 2008;90:2751-2762.
1.A distance of >20 mm between the tibial tubercle and the trochlear groove, and trochlear dysplasia, or it can result from soft-tissue abnormalities, s
2.The recent literature does not support the use of an isolated lateral release for the treatment of patellar instability.
3.A patient with recurrent instability, with or without trochlear dysplasia, who has a normal tibial tubercle-trochlear groove distance and a normal patellar height, may be a candidate for a reconstruction of the medial patellofemoral ligament with autograft or allograft.
4. Distal realignment procedures are used in patients who have an increased tibial tubercle-trochlear groove distance or patella alta. The degree of anteriorization, distalization, and/or medialization depends on associated arthrosis of the lateral patellar facet and the presence of patella alta. Associated medial or proximal patellar chondrosis is a contraindication to distal realignment because of the potential to overload tissues that have already undergone degeneration.
5.The incidence of primary patellar dislocation is 5.8 per 100,000 [4 fold increase between 10-17
The recurrence rate ranges from 15% to 44%
6.Radiographic Evaluation
1.The congruence angle 6° ± 11° in the medial direction.
2. The sulcus angle 138° ± 6°.[>145° =trochlear dysplasia
3. The lateral patellofemoral angle [Laurin]
4. Patella alta :The Blackburne-Peel ratio
The Insall-Salvati ratio.
<u>5.Trochlear dysplasia is represented on a perfect lateral radiograph by the so-called crossing sign,</u>
7. Lateral Release shown to be ineffective for the treatment of patellar instability.

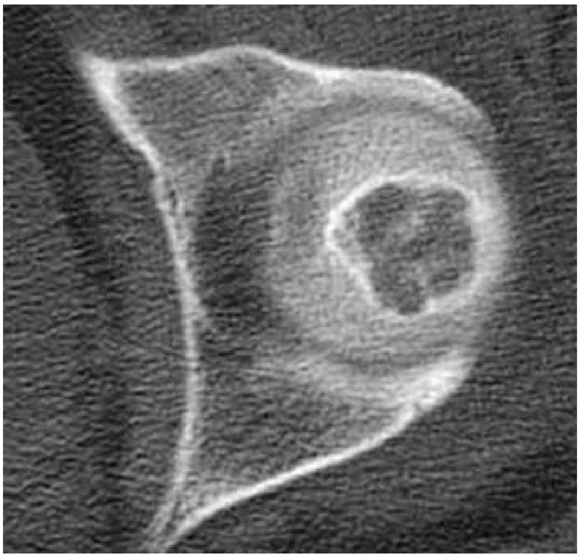
VI.Case Report

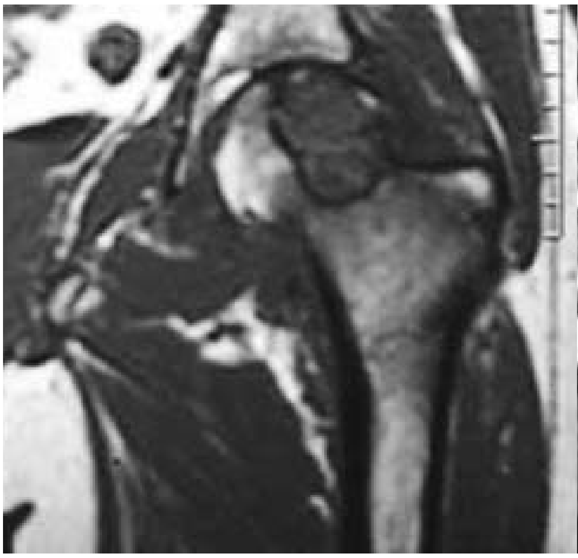
Hip Pain in an 30-year-old female

30 year-old female presented with a 6-month history of left hip pain. There was a gradual onset of pain that became persistent over the 12-month period. The pain was affecting her activity level.
On physical examination, the patient appeared healthy with stable vital signs. There was no soft tissue mass were present around the hip. Range of motion of the hip revealed pain with rotation, greater with external than internal rotation. Flexion and extension did not produce pain. The neurovascular exam was normal, Laboratory examination was unremarkable.
Anteroposterior and lateral radiographs (Fig. 1), radionuclide Tc-99m methylene diphosphonate bone scan (Fig. 2), and magnetic resonance imaging (MRI) (Fig. 4).
Based on the history, physical examination, laboratory studies, and imaging studies, what is the differential diagnosis?

Imaging Interpretation

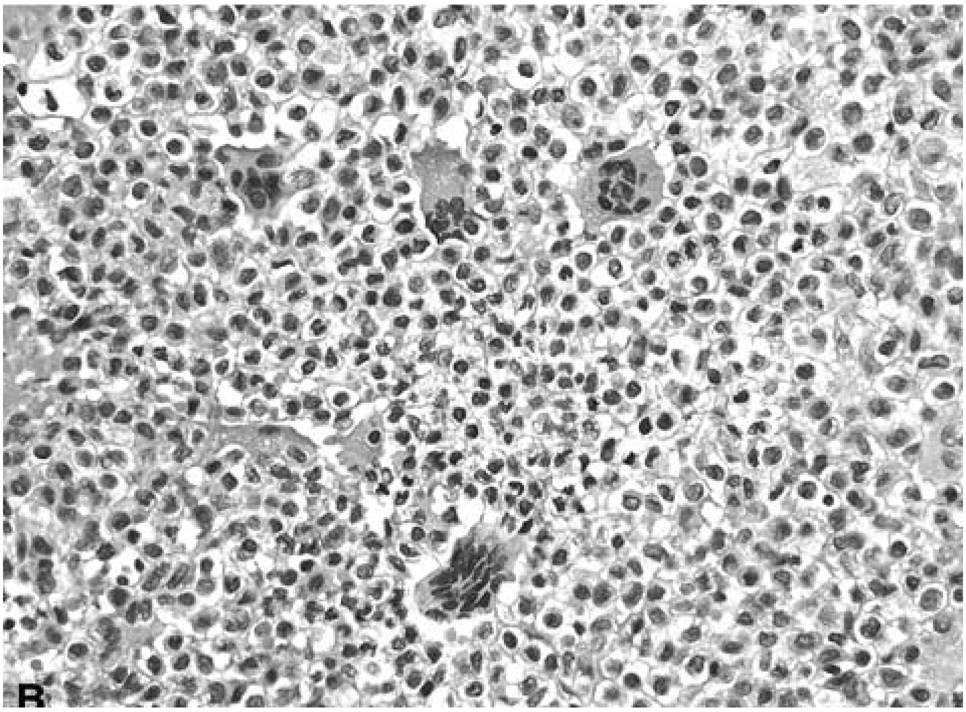
Radiographs displayed a well-defined lesion with radiodense margins within the epiphysis of the femoral head, with slight extension into the metaphysis. No substantial periosteal reaction was present (Fig. 1). The lesion showed marked uptake of radiotracer on bone scan (Fig. 2). CT scan showed a sharply marginated lesion in the proximal epiphyseal-metaphyseal region of the femur, and faint mineralization was visible within its matrix.





Differential Diagnosis
Aneurysmal bone cyst
Chondroblastoma
Chondromyxoid fibroma
Clear cell chondrosarcoma
Enchondroma
Giant cell tumor

Histology Interpretation
Incisional biopsy revealed a cellular neoplasm composed of islands of immature cartilage surrounded by a proliferation of mononuclear cells and scattered multinucleated giant cells. The mononuclear cells had abundant cytoplasm with well-defined cytoplasmic borders, imparting a ‘‘cobblestone’’appearance in areas. These cells possessed uniform nuclei, often containing a longitudinal groove. Calcification was prominent throughout the lesion and varied from coarse to ‘‘chicken wire’’ in appearance



Diagnosis
Chondroblastoma of the proximal femur

Discussion and Treatment
Chondroblastoma is a rare, benign bone tumor originally described by Jaffe and Lichtenstein in 1942. Chondroblastomas account for 1% of primary bone tumors, occur most often in the epiphyses of long bones, and occasionally extend into the metaphyses . Lesions arise eccentrically. Chondroblastomas may arise in small bones, such as the tarsals, or in the apophyses of bones.

Given the well-defined, geographic, regular border demarcating the lesion in our case, infection was not given strong consideration when correlated with the patient's presenting complaints and lack of systemic symptoms. Aneurysmal bone cysts are benign lesions with cystlike walls, mostly consisting of cellular fibrous septa separated by blood. Long-bone metaphyseal location of the lesion can also aid in diagnosis of aneurysmal bone cyst. Up to 50% of ABC tumors are secondary to other reactive lesions, such as chondroblastomas.
Simple bpne cysts occur most often in pediatric and adolescent patients, they belong in the differential diagnosis in this age group. I

Chondromyxoid fibroma is a benign, cartilaginous neoplasm composed primarily of myxoid cartilage and accounts for less than 1% of all primary bone tumors. Lesions are most commonly located in the metaphyses of the major long bones, with a predilection for the proximal tibia. Chondromyxoid fibroma mainly affects individuals in the second or third decades of life and has a slight male predominance.

Clear cell chondrosarcoma is a rare, malignant tumor that represents around 0.2% of all primary bone tumors. These tumors commonly arise in the epiphysis and 59% involve the proximal femur. Clear cell chondrosarcoma has been reported in patients as young as 14 years; however, it primarily affects individuals older than 20 years, with a mean age of 39 years . Clear cell chondrosarcoma and chondroblastoma can be difficult to differentiate radiographically because both are usually centered within the epiphysis and possess margins of sclerosis. However, the characteristic features of clear cell chondrosarcoma that chondroblastoma lacks are enlarged clear cells and foci of reactive bone trabecule.

Enchondroma is a benign, cartilaginous lesion that typically arises in the medullary canal of tubular bones and accounts for 3% to 10% of all primary bone tumors.Solitary enchondromas are found in the metacarpals or phalanges in approximately 50% of the cases, and 20% of the lesions involve the proximal or distal femur . Enchondromas affect both males and females equally and usually occur in individuals between 20 and 40 years of age. Solitary enchondromas are most commonly asymptomatic

They are not typically located in an epiphysis. Pathologically, these lesions consist of small clusters of proliferating, but differentiated chondrocytes surrounded by areas of hypocellular, basophilic matrix. Moreover, these clusters contain areas where two chondrocytes are present within a single lacuna, mimicking the appearance of a binucleated cell.

Giant cell tumors often occur in the epiphyseal-metaphyseal portion of long bones and are appropriate for the differential diagnosis. Demographically, giant cell tumors affect females more frequently than males (1.3:1), and 98% of giant cell tumors occur in individuals older than 25 years with closed physes . Most adolescent giant cell tumor cases occur in females due to earlier skeletal maturation. Radiographically, giant cell tumors differ from chondroblastomas as purely radiolucent lesions without the intralesional calcification present in chondroblastomas.
Giant cell tumors rarely contain this feature. The mononuclear cells in giant cell tumor and chondroblastoma are histologically similar, but the cobblestone appearance of the chondroblasts is absent

Individuals affected by chondroblastoma are usually adolescents. Many lesions have been discovered in open, closing, and closed epiphyseal growth plates. 75%percent of lesions occur in patients who are in the second decade of life, with a male to female incidence of 2.5:1. Over 70% of the lesions involve the long bones, with the proximal humerus being the most common location.
Because 98% of the lesions originate within the epiphyses, the radiographic location of the chondroblastoma is the critical diagnostic feature .
MR images are useful in judging the size of the chondroblastoma, but the signal intensity of the lesion varies between cases . Chondroblastomas usually demonstrate a low-intensity signal on T1-weighted images.As with any cartilaginous lesion, chondroblastomas can demonstrate mixed signal intensity on T2-weighted images. Areas consisting of mature cartilage will demonstrate high signal intensity due to the high water content. In addition, low intensity signal areas may be seen due to calcification, immature chondroid matrix, and hemosiderin
Treatment of chondroblastomas is required for attempted cure since no evidence has shown that these lesions resolve spontaneously. Chemotherapy is not indicated, and radiation therapy is contraindicated because of the resulting risk of malignant transformation . Surgical treatment via curettage and bone grafting is the most common procedure used to treat chondroblastomas. The recurrence rate for Stage 2 lesions is approximately 10% .
An open biopsy was performed on our patient. and the diagnosis of chondroblastoma was confirmed.
A prophylactic internal fixation of the femoral head and neck.