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CONTENTS

I.Journal Club

1. Nonoperative Treatment Compared with Plate Fixation of Displaced Midshaft Clavicular Fractures. A Multicenter, Randomized Clinical Trial. J Bone Joint Surg Am. 2007;89:1-10

Prospective, randomized, 132 [65 in each group); good selection criteria

Constant score, Dash score in 62 in operative. 49 in non-operative [less committed]

Results:

Operative better score [significant]

X ray union: 28 wks in Non-op and 16 weeks in op

Complete cortical bridging in 2 views.

NU: lack bridge at one year/movement

Patient satisfaction regarding appearance is better in operated group

Mal-union: Shortened or angulated causes weakness, fatigability, pain on overhead activities

Non –op: Symptomatic MU: 14% and NU 11% [operative NU 3%]

Operative: 5 had hard ware irritation, 3 infection and one failure]

Discussion

clavicle 2.6% of fractures and 80% are midshaft

Historical: Neer/Rowe: 2235: non-union is rare and treat in a sling. Malunion is subclinical

Recent metanalysis: NU is 14% with non-op and 2% with operative

Malunion is not always asymptomatic. IN a study of 200 patients: at 10 years in adults: 46% still had some symptoms. In some situation: corrective osteotomy and plate fixation helps.

2. **Total Hip Arthroplasty and Hemiarthroplasty in Mobile, Independent Patients with a Displaced Intracapsular Fracture of the Femoral Neck. A Randomized, Controlled Trial** J Bone Joint Surg Am. 2006;88:2583-2589. Bristol. Bannister

Prospective randomized in mobile [walks 2 km] active > 60, 40 in each group; Median ASA 2 [1-3]

Validated SF 36, Oxford hip score, Mini mental score

CPT prosthesis through the Hardinge and Hemiarthroplasty using endofemoral head [Zimmer]

Hemi: 2 deaths PE; 6 died at 3 years; 33/41:THR : 2 died, 3 dislocation and 3 infection

Outcome

Hemiarthroplasty:Greater hip disability [Higher oxford score] an d shorter walking distance [1.km Vs 2.23]

66% acetabular erosion and higher subsidence; No dislocation and 1 infection, 2 revised to THR.

Overall 12% revision Vs 2.5% for THR

3. Exchange Nailing of Ununited Fractures Mark R. Brinker, ;89:177-188

1. Exchange nailing is most appropriate for a nonunion without substantial bone loss.

2. The exchange nail should be at least

   1 mm larger in diameter

   Canal reaming is required

Indications

1.Exchange nailing is an excellent choice for aseptic nonunions of noncomminuted diaphyseal femoral/Tibial fractures, 72% to 100%

2. Is not recommended for distal femoral nonunions at this time.

3.Is generally not indicated for humeral nonunions.

Klemm reported on a series of thirty-six patients in whom an infected femoral or tibial nonunion had been treated with nail exchange, continuous-irrigation suction drainage, and antibiotic therapy[6]. All sixteen infected femoral non-unions healed, and nineteen of twenty infected tibial non-unions healed. This is controversial

Effects of Exchange Nailing

A. The biological effects result from reaming of the medullary canal

1.Reaming of the medullary canal increases periosteal blood

2. The periosteum reacts to the increased blood flow by forming new bone

3.The products of reaming, which contain osteoblasts and multipotent stem cells. At the present time, there is no consensus in the literature regarding whether reaming products act as local bone graft in cases of nonunion.

B. The mechanical effects result from the use of a larger-diameter intramedullary nail.

Court-Brown reported that, of 33 patients with aseptic diaphyseal tibial nonunions, twenty-five healed after one exchange nailing procedure and four more healed after a second exchange nailing[15]. The four nonunions for which two rounds of exchange nailing had failed required bone-grafting to achieve osseous union.

Non-unions were associated with

bone loss exceeding 30% of the cortical diameter.

Comminuted fracture

Gap of 2cm :Require subsequent bone-grafting procedure.

3. Failure Analysis of a Ceramic Bearing Acetabular Component. 2007;89A:367-375

Background: Alternative bearings have been explored in an attempt to improve the longevity of total hip prostheses. A Food and Drug Administration (FDA)-approved clinical study of a nonmodular acetabular component consisting of a porous metal shell, compression-molded polyethylene, and a ceramic liner inlay was discontinued following reports of early failures.

Methods: Between October 1999 and January 2003, 429 patients were enrolled in a prospective study to evaluate a cementless ceramic-on-ceramic total hip arthroplasty design (Hedrocel ceramic bearing cup)

315 hips: Experimental acetabular implant

157 hips: were treated with an acetabular implant that consisted of the same porous shell but an all olyethylene liner.

Failure was defined as fracture or displacement of the ceramic liner out of the acetabular component.

Results

The ceramic liner failed 14/ 315 experimental acetabular components

Patients with a body weight of >91 kg had a 4.76 times greater odds of the ceramic liner failing than those who weighed ≤91 kg.

Retrieval analysis demonstrated stripe and rim wear with evidence of adhesive wear, indicating a potentially high-friction interaction at the articulation.

Finite element analysis demonstrated that the forces on the ceramic liner in cups subjected to extreme loading conditions were insufficient to cause fracture.

Conclusions: We hypothesized that the combination of a high patient body weight, an extensive range of motion, and subluxation of the femoral head led to high friction at the articulation between the femoral head and the rim of the liner, which initiated displacement of the ceramic liner. Subsequent normal gait led to further displacement of the liner in all of the fourteen failed components and eventually to ceramic fracture in twelve of the fourteen components.

4.Manipulation After Total Knee Arthroplasty JBJS2007;89:282-286.

Following TKA, some patients fail to achieve >90° of flexion . The purpose of this study was to assess the outcomes of manipulation following total knee arthroplasty.

113 underwent manipulation with flexion of ≤90° at a mean of 10 wks ; Measured with a goniometer .90% achieved improvement of ultimate knee flexion following manipulation.

The average flexion was 102° prior to TKA, 111° following skin closure, and 70° before manipulation.

The average improvement: Recorded at the five-year follow-up was 35

There was no significant difference in the mean improvement in flexion when patients who had manipulation within twelve weeks postoperatively were compared with those who had manipulation more than twelve weeks postoperatively.

Conclusions: Manipulation generally increases ultimate flexion followingTKA. Patients with severe preoperative pain are more likely to require manipulation.

Discussion

The results of the present study indicate that manipulation can result in significant and lasting improvement in knee flexion.

The average increase in flexion from the measurement made before manipulation to that at the most recent follow-up was 35°,

It does not support the findings : an initial gain in flexion following MUA was lost within one week

10% with continuous knee pain failed to gain flexion following manipulation.

The interval between TKA & manipulation did not affect the amount of improvement in flexion.

The knees that had manipulation in the current study represent only 1.8% ; the survival rate of the prosthesis was 98.9% at fifteen years[6].

Manipulation Protocol

GA;Hip flexed to 90°, the knee was gently manipulated into flexion until audible and palpable lysis of adhesions was complete. Physical therapy was instituted

With the hip flexed to 90°, the knee was flexed maximally and held by the therapist for thirty to sixty seconds and then the hip and knee were allowed to extend. This maneuver was repeated five times. Between active-assisted flexion and extension by the therapist, the hip and knee were positioned at 90° of flexion.

Complications

1 supracondylar femoral:

2. 9 continuous pain did not gain flexion with manipulation.

3.4% in the manipulation:Revision TKA.

5. **Results of Metal-on-Metal Hybrid Hip Resurfacing for Crowe Type-I and II Developmental Dysplasia J Bone Joint Surg Am. 2007;89:339-346**

Analyze the mid-term results in a consecutive series

51 patients; 43.7 years; Follow up 6 yrs; transtrochanteric osteotomy.

6 had Crowe type-II developmental dysplasia of the hip and fifty-two had type-I.

Results

UCLA hip score: 3.2 to 9.3

Walking, from 6.0 to 9.7 points;

The score for function, from 5.7 to 9.6 points;

Short Form-12 (SF-12) mental score increased from 46.6 to 53.5 points, and the mean SF-12 physical score increased from 31.7 to 51.4 points

There were five femoral failures requiring conversion to a total hip arthroplasty. One hip showed a radiolucency around the metaphyseal femoral stem.

Conclusions: The mid-term results of metal-on-metal resurfacing in atients with Crowe type-I or II developmental dysplasia of the hip

Acetabular failures were more prevalent than failures on the femoral side. Also, survivorship analysis comparing cemented total hip prostheses with cemented resurfacing implants in young patients with developmental dysplasia of the hip showed similarly poor results in association with both prosthetic designs

Discussion

The dominant mode of failure was acetabular loosening (71%), often with considerable bone loss. The remainder of the failures were associated with femoral neck fracture (16%) or aseptic loosening (13%). New surface arthroplasty implants with metal-on-metal bearing surfaces and a thinner noncemented acetabular cup have alleviated the problems of osteolysis secondary to polyethylene The two femoral neck fractures Three of the femoral components that loosened

There has been some concern regarding the advisability of implanting metal-on-metal implants in women of childbearing age because of a concern that the ion levels may causebirth defects.

6.Navigated Total Knee Replacement 2007;89:261-269 JBJAA

Background: Proponents of navigated TKA Vs conventional; metanalysis

Methods: Major medical and publishers' databases for randomized trials

33 studies ;67.3 ± 4.1 years

The alignment of the mechanical axes did not differ

No conclusive inferences could be drawn on functional outcomes or complication

Conclusions: Navigated TKA replacement provides few advantages over TKA.

Introduction

Restoring the mechanical limb axis is considered a major goal of knee arthroplasty,

Placing components within ±3° of the mechanical axis is advocated to prevent premature implant failure and to improve prosthesis survival times.

The mean preoperative deviances from the mechanical limb axis were 2.3° ± 5.1° of varus alignment for all patients, 2.4° ± 5.1° for those who had navigated surgery, and 2.2° ± 5.3° for those who had conventional surgery.

Discussion

1.Meta-analysis failed to show a meaningful advantage of navigated over conventionalTKA

2. Navigation reduces the relative risk of 3° of malalignment by 25%.

3. Radiolucent lines occur more frequently in knees with ≥3°of varus

4. The cost-effectiveness of computer-assisted orthopaedic surgery. extra charges of $430

Navigation is advocated in complex cases; for example, in patients with posttraumatic deformities or indwelling plates or nails[54]. However, in the hand of experienced surgeons, restoring the limb axis by simultaneous intra-articular bone resection and soft-tissue balancing or femoral osteotomy yielded excellent results

7. **A prospective study of pyogenic sepsis of the hip in childhood JBJS 89 B: 100. Nunn**

2004 and December 2005; Prospective; Sepsis of the hip in childhood ; 9 rural hospitals.

All the hips were drained by arthrotomy and the diagnosis was confirmed microbiologically and histologically; 3 M -18 yrs [8 months]; 40 cases; The male-to-female ratio was 3:1

Epidemiology: 24% had multi-focal sepsis.
34% had a full and uncomplicated
66% had complications

The early correct diagnosis of this condition, common in the developing world, remains a significant factor in improving the clinical outcome.

It is thought that adequate treatment within 5 days of the onset of symptoms can avert serious complications

A retrospective review from Cape Town of 186 cases reported a complication rate of 9% for avascular necrosis and chondrolysis.[4]

It was our policy that all patients suspected of hip sepsis were transferred as an emergency to the regional unit after a single dose, appropriate to body weight, of intravenous cloxacillin.

Technique

An anterior incision in the groin crease and an approach to the hip lateral to the femoral sheath

Intravenous cloxacillin (200 mg/kg/24 hours ➔? oral flucloxacillin (100 mg/kg/24 hours).6 wks

Children <2 years received a cefotaxime; 100 mg/kg/24 hours.

Additionally, a hip spica: signs of subluxation or AVN of the joint and to those who developed avascular necrosis or destruction of the joint.

Children with a ‘complicated’ outcome included those with joint stiffness with or without the presence of radiological chondrolysis, avascular necrosis (partial or total), coxa vara, destruction of the physis, pathological fracture of the femoral neck and chronicity of infection with the formation of sequestra.

Clinical Feature

27/40 could weight bear;

Three neonatal patients presented with pseudoparalysis

Fever (> 38°C) was seen in 28 patients (74%; Leucocytosis was seen in 27 patients (71%).

All ESRs were > 40 mm/hr; 2 presented with dislocation of the septic hip.

84% were initially misdiagnosed or initially treated with antibiotics alone

The mean delay from the first presentation : 13.1 days

70% most with *Staphylococcus aureus*

Ultrasound was used routinely to detect subcapsular distension.There were two false-negative scans.

Results: 30% AVN; 10% T Smith arthritis; 20% joint stiffness and pain, four (10%) of which had radiological features of chondrolysis, 8% had coxa vara

Discussion

1.Incidence of hip sepsis: 1:20 000

2. The complications of infection of the hip are associated with a delay

3. Some children with a delay to arthrotomy of more than five days had a chance of full recovery if they had been on appropriate early intravenous antibiotics

3. Antibiotics should not be withheld for the sake of obtaining positive culture results

4. The method of drainage of septic joints is controversial. [Aspiration of septic shoulders]

5. In comparison with other studies, our results are among the worst of any reported with 66% of patients having a complicated outcome, although the final outcome in this group would necessitate long-term follow-up into adult life..[A Scottish series showed a complication rate of 30% and an Australian series of 41%. A North American study showed a clinically unsatisfactory result of 48%]

8.**Arthroscopic Compared with Open Repairs for Recurrent Anterior Shoulder Instability** 2007;89 A:244-254. **A. Matsen**

Results Meta-analysis revealed that, compared with open methods, arthroscopic repairs were associated with significantly higher risks of recurrent instability

Arthroscopic approaches were also less effective than open methods with regard to enabling patients to return to work and/or sports

Conclusions: The available evidence indicates that arthroscopic approaches are not as effective as open approaches in preventing recurrent instability or enabling patients to return to work. Arthroscopic approaches resulted in better function as reflected by the Rowe scores in the randomized clinical trials. The study design and the arthroscopic technique had substantial effects on the results of the analysis.

Discussion

These analyses are intrinsically limited by several factors

(1) each surgeon applies each technique somewhat differently

(2) the needs of individual patients may prompt modifications of the methods within a given surgeon's practice

(3) surgeons are unlikely to be equally competent with two different techniques.

Open approaches are more reliable for restoring stability. Pooled data demonstrated significantly lower risks of recurrent instability, dislocation alone, and a reoperation after open procedures.

Arthroscopic approaches resulted in better Rowe scores. This was the case for both arthroscopic procedures done with suture anchors and those done with bioabsorbable tacks. As half of the Rowe score is determined by stability, differences were likely due to higher scores for function and motion (which account for the other half of the score) after arthroscopic repair. Although arthroscopic approaches resulted in better Rowe scores, they were not as good as open approaches in enabling patients to return to work or sports.

Although the data did not allow a direct comparison between arthroscopic techniques, bioabsorbable tacks seemed to perform better than the other two arthroscopic techniques, as there were no differences in the stability end points between the bioabsorbable-tack and open techniques. The transglenoid sutures performed poorly compared with open techniques.

First, many surgeons will not attempt an arthroscopic repair in patients who have a large osseous defect (≥25% of the glenoid or ≥21% of the glenoid length), in athletes who play contact sports, or in patients with multiple recurrences. Inclusion of such patients in previous series may have contributed to the inferior results seen with the arthroscopic approach. We did not perform a subgroup analysis of these factors, as the data were not presented in a way that allowed this to be done, so unfortunately we were unable to clarify this issue.

In conclusion, the available evidence indicates that recurrence rates are higher after use of arthroscopic techniques, even those involving suture anchors. While return to work and/or sports was better after open repairs, Rowe scores were better following arthroscopic repairs.

9. **Surgical treatment of varus malunion of the proximal humerus with valgus osteotomy** *J* ShoulderElbow Surg 2007;16:55-59

Among the complications of 2-part fractures of the upper end of the humerus, little attention has been paid to the treatment of the varus malunion. However, thisdeformity frequently causes pain and disability of theshoulder. To improve this condition, we treated thismalunion with a valgus wedge osteotomy. From Augus1995 to January 1999, 5 patients with this deformity,all complaining about pain or unsatisfactory functionof the shoulder (University of California, Los Angeles score _13), underwent osteotomy and internalfixation with a plate and screws. The mean agewas 53 years (range, 25-73 years), there were 4 malepatients, and the left side was involved in 4 cases. Themean follow-up was 34 months (range, 22-63months). Union occurred in all cases by 6 weeks.Three of the results were excellent, and two were good.(University of California, Los Angeles score _30). Allpatients were satisfied with the treatment.

10. Single-incision repair of acute distal biceps ruptures by useof suture anchors.

J Shoulder
Elbow Surg 2007;16:78-83

The purpose of this study is to report the results of a single limited-incision technique for repair of acute distal biceps ruptures by use of suture anchors. Sixty consecutive patients underwent distal biceps repair after an acute rupture between January 1997 and January2001 by use of a limited antecubital incision and suture anchors. Fifty-three patients could be evaluated ata mean follow-up of 38.1 months. A limited transverse incision was made in the antecubital fossa. The retractedbiceps tendon end was identified, retrieved,and lightly debrided. Two suture anchors were placed in the radial tuberosity, and the tendon was reapproximated.Final follow-up consisted of physical examination, radiographs, and Andrews-Carson elbow score tabulations. According to the Andrews-Carson scores, there were 46 excellent and 7 good results. In 2 patients, heterotopic ossification developed that resulted in a mild loss of forearm rotation and mild pain. In 1patient, a temporary radial nerve palsy developed,which resolved completely within 8 weeks. Repair of acute distal biceps tears via a limited antecubital incision and suture anchors is a safe, effective technique.

II. Free Articles

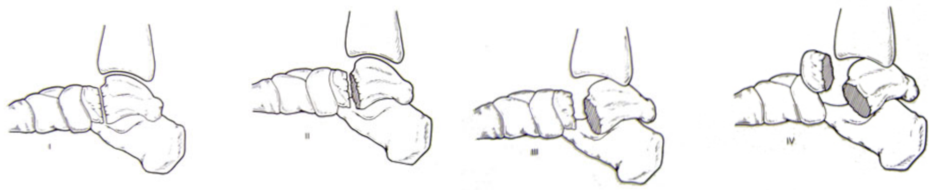
Talar Neck Fractures: Results and Outcomes. Vishal Pai MBChB,Middlemore Hospital, Auckland. CJOS 1.1,2007

ABSTRACT
Talar neck fractures occur infrequently and have been associated with high complication rates. The purposes of the present study were to present the Dunedin experience of this fracture with main reference to incidence, type of treatment and determine the functional outcomes after operative treatment of such fractures. I retrospectively reviewed the records of 41 patients with fracture talus. There were 16 fractures of neck of talus which form the major part of this study. Complications and secondary procedures were reviewed, and radiographic evidence of osteonecrosis and posttraumatic arthritis was evaluated. The Foot Function Index and Musculoskeletal Function Assessment questionnaires were administered[1].

INTRODUCTION
The talus forms the ankle joint with the tibia, the subtalar joint with the calcaneus and the midtarsal joint with the navicular bone. Talar fractures are grouped into head, neck, body, lateral & posterior process fractures [Fig 1]. There is no musculotendinous attachment for talus and 60% of its surface is covered by cartilage, hence circulation is limited[2]. This explains high incidence of avascular necrosis (AVN) following fracture neck of talus.

The degree of displacement in talar neck fractures [as suggested by Hawkin's classification] is directly proportional to the rate of avascular necrosis.

The Hawkin's classification system. [Fig 1]
Group 1 – Undisplaced
Group 2 – Displaced with dislocated subtalar joint
Group 3 – Displaced with dislocation form both the subtalar and ankle joints.
Group 4 – Type 3 with dislocation of the talar head.



Group I Group II Group III Group IV

The recommended treatment for fractured neck of the talus[4] : Cast treatment for Group I; closed reduction and screw fixation for Group 2; and open reduction and fixation for Group 3 & 4.

In an extensive study , Hawkins[3] noted avascular necrosis 0, 42% and 91% in Group I, II and III respectively. Canale and Kelly[5] later modified this classification scheme, describing a fourth type of talar neck fracture with associated talonavicular dislocation. Studies in the literature to date have demonstrated the occurrence of osteonecrosis in association with as many as 13% of Hawkins' I fractures, as many as 50% of Hawkins' II fractures, as many as 84% of Hawkins' III fractures, and as many as 100% of Hawkins' IV fractures[6,7,8].

The main purpose of this study is to evaluate the clinical, radiographic, and functional outcomes of treatment for the fractured neck of talus with a demographic study of the fractured talus.

MATERIALS AND METHODS
I reviewed retrospectively 41 consecutive patients with a fracture talus admitted in Dunedin Hospital between 1996 and 2003. Patient information was obtained from their clinical notes, via a questionnaire or a telephone interview. This work was performed under the guidance of Prof. J.C. Theis [Associate Professor of Orthopaedics] after obtaining ethical approval.

These fractures were grouped under different types, depending on the fracture morphology [Table I]. The age range was 15 to 56 with a mean of 38 years and 66% were in men. The mechanism of injury was a motor vehicle accident for seventeen patients, a fall from a height for seventeen sports-related trauma for six, and an industrial accident for one. Plain radiographs of the foot and ankle were made in all cases. The fractures were classified into groups as described by Hawkins[3] and modified by Canale and Kelly[5]

Although closed, manipulative reduction was attempted at the time of the initial assessment, all fractures subsequently were treated with open reduction and internal fixation with stainless steel small-fragment and/or mini-fragment implants through anterior or posterior surgical approaches. Table 2 shows that majority of type II and III neck fractures were treated with internal fixation.
The radiographs were made at 6 weeks, 12 weeks, 6 months and annually thereafter.

1. Union was defined as disappearance of the fracture lines
2. AVN was defined as relatively increased density of the talar dome
3. Arthrosis was defined as loss of joint space, osteophytes, or subchondral sclerosis.

In order to evaluate the functional outcome and health status of this group of patients, we administered the Foot Function Questionnaire. Attempts were made to locate all patients but I could not trace three of the sixteen patients with fracture neck of talus. The patients who failed to answer the questionnaire were contacted by telephone and interviewed.Results:

RESULTS
Of the 41 talar fractures seen during this study period, there were sixteen fractures of the talar neck [Hawkins Type I in 6; type II in 8 and type III 2]. In five additional cases there was fracture neck of talus with associated fracture of either body or head or lateral process. [Table 1]
All type 1 fractures were treated in a cast and the average time till full weight bearing was 7.7 weeks. There was one type 1 fracture that was comminuted and this was not included in the previous result as it was an outlier, taking 12 weeks till the patient could fully weight bear. All eight type 2 fractures were treated by ORIF and took an average of 21.2 weeks till full weight bearing. Type 3 fractures were also treated by ORIF and took an average of 33 weeks till full weight bearing. Anatomic reduction was achieved in fifteen out of sixteen patients.

TABLE 1 – Type of fracture

Fracture types	No. of Patients	% of total
Neck	16	39
Head	4	10
Body	4	10
Dome	2	5
Complex	5	12
Lateral/posterior process	2	4
Osteochondral fragments	8	20

Table 2: Treatment of fracture neck of talus

Type of fracture	Non-operative		Operative:	
	Cast	Closed reduction	ORIF	Excision
Neck				
Type I	6	-	-	-
Type II	-	-	8	-
Type III	-	-	2	-

TABLE 3: Clinical Outcome [Questionnaire/clinical notes] of fracture neck of talus

Patient	Type of Fracture	Pain	ROM	Walking	Stairs	Functional outcome	Remarks
1. TO	Type I	Mild	Fair	Good	Good	Good	Quest.
2. CO	Type II	?	?	?	?	?	LFU
3. GE	Type II	?	?	?	?	?	LFU
4. OR	Type II	Mild	Good	Normal	Normal	Good	Records
5. BA	Type I	?	?	?	?	?	LFU
6. DR	Type I	None	Good	Good	Good	Good	Records
7. FA	Type III	Mild	Fair	Good	Good	Fair	Records
8. FO	Type I	Mild	Normal	Good	Good	Good	Phone

9. LA	Type III	Moderate	Fair	Good	Good	Good	Phone
10. TH	Type I	Mild	Poor	Fair	Fair	Fair	Phone
11. RO	Type II	Moderate	Poor	Poor	Poor	Poor	Quest.
12. BR	Type II	Mild	Fair	Good	Good	Good	Quest.
13. Bro	Type II	Moderate	Poor	Fair	Fair	Fair	Quest.
14. HO	Type I	None	Normal	Normal	Normal	Excellent	Quest.
15. CO	Type II	Mild	Fair	Good	Good	Good	Quest.
16. SM	Type II	Extreme	Poor	Poor	Poor	Poor	Quest.

Of the 13 patients with a complete follow up, there were eight good-excellent results; 3 fair results and two poor results.
Out of these 7 patients with AVN, 4 were Hawkins type II fractures, 2 were type III fractures, and 1 was a complex fracture. 5 patients developed malunion, 1 patient developed non-union, 1 patient with delayed union, 1 patient had delayed superficial infection and 8 patients developed arthritis.

Table 4: Complications of all talar fractures

Type of Fracture	Osteoarthritis	AVN	Malunion	Nonunion
Neck				
Type I	0% (0)	0% (0)	17% (1)	0% (0)
Type II	43% (3)	57% (4)	29% (2)	29% (2)
Type III	50% (1)	100% (2)	50% (1)	0% (0)
Body	20% (1)	0% (0)	0% (0)	0% (0)
Complex	40% (2)	20% (1)	20% (1)	0% (0)

DISCUSSION

Historically, “flying accidents” were a common cause and hence talar fractures were coined the “aviator’s astragalus” [9]. However, today these fractures usually occur as a result of motor vehicle accidents or falls from heights, which occurred in 84% of the injuries in my study. A high incidence [67%] of associated injury of both adjacent structures and remote structures in relation to talar neck fractures been reported by Hawkins. The incidence of associated injuries in this series was 56%.
The fracture neck of talus is not a common fracture and occurs in 30% of talar fractures[7]. It is second in frequency to chip and avulsion fractures[8]. The incidence in the present series of 41 cases is 37%.
Hawkins classification[3] for fracture neck talus proved to be very helpful in predicting the long- term outcome. My complication chart [Table 4] agrees with this. Patients with talus fractures of Hawkins' type I and II had considerably better outcomes (with 95% being excellent or good) than individuals suffering dislocated fractures with involvement of the articulating surface. Pajendra[6]claims there were 70% good results in Hawkins' type III and 10% good results in Hawkins' type IV fractures. In a series of 102 cases of fracture neck of talus, Vallier[10] reported 39% of Avascular necrosis in type II and 64% in type IV fractures.
Mild to moderate osteoarthritis of the ankle joint was seen in 5 patients (and severe osteoarthritis in 2 patients (40%), 1 of whom is waiting for an arthrodesis. Schulz[11] reviewed 80 talar fractures of which 80% reported significant stiffness. In the present series the ankle joint, subtalar joint or both was significantly stiff in 70% of patients.
There are many pitfalls in this study.
1.There is a relatively small series of the fractured neck of the talus.
2.This is a retrospective study.
3.The surgery was carried out by different surgeons with varying experience.
4.A fair amount of patients were lost to follow-up.
5.Documentation regarding post-operative assessment was incomplete
However, with the available information it is still possible to come to a reasonable conclusion or trend of the outcome of these fractures.

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III Notes
CLUBFOOT
EPIDEMIOLOGY

Multifactorial
1:1000 live births Caucasians
3:1000 live births Polynesians
Sex: Male: Female 2:1
50% Bilateral

PATHOLOGY

Bones	Medial and plantar deviation of the neck of the talus
Contracted tendon	Achilles tendon Tibialis posterior FDL,FHL
Joints	Dislocation of talo-navicular joint [navicle is medial] Thickened joint capsules: of ankle, subtalar, talonavicular, calcaneocuboid joints
Contracted Ligaments	Calcaneofibular ligament Superficial deltoid ligament Spring ligament Long and short plantar ligament Plantar fascia Tibiofibular ligament Master knot of Henry
Thickened Tendon sheath	Peroneal sheath Sheath of tibialis posterior
Blood vessel	90% deficiency of anterior tibial artery

CLINICAL ASSESSMENT

History Pregnancy, Birth,
Family history, any other syndromal,
Any neurological causes like spina bifida or cerebral palsy,
Previous treatment
.

DEFORMITY Forefoot varus (adduction and inversion)
Heel: Varus
Equinus at the ankle

CLASSIFICATION [HAROLD AND WALKER]

Mild	Varus and equinus deformity manipulated beyond neutral position
Moderate:	Varus and equinus within 20º short of neutral
Severe	Varus and equinus cannot be reduced within 20º of Neutral

Presence of medial skin crease and small heel size suggest severe type of clubfoot.
Also note that the size of the foot is short and leg appears wasted
Neurological examination is indicated in case of clubfoot

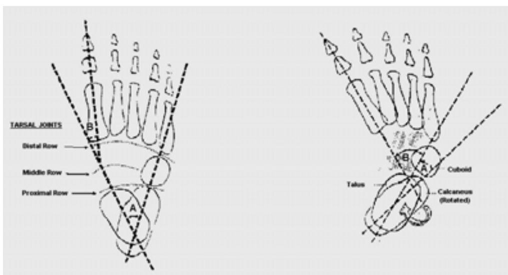
Check for DDH
Spine

RADIOLOGICAL

Talo-calcaneal angle

Normal 25º-50 º in

AP and Lateral view



TREATMENT

<3 months	Ponsetti technique with or without heel cord release 20% still requires comprehensive release at 6 months
<5 yrs	Postero-medial release: Cincinatti
> 5 yrs	Evans procedure Dwayer's (osteotomy of the calcaneum) Lengthen medial column and shorten lateral column SPLATT is a split tibialis anterior transfer
> 10 yrs:	Lateral wedge tarsectomy or Triple if the foot is mature

Results at 30 year follow up.

1. **Ponsetti**
   Good to excellent in 80% and 30% may have mild osteoarthritis ankle

2. **Extensive [cincinatti]**
   Good to excellent 30%;and 56% may have moderate to severe osteoarthritis

PONSETTI TECHNIQUE IS COMMONLY USED

Ponsetti technique: Acronym: **CAVE** start at 4 weeks
The cavus deformity must be corrected with the first cast.
The forefoot is supinated and this tends to exaggerate the appearance.
Next the forefoot adduction is corrected with some hindfoot varus with ankle in equinus
This is followed by Hindfoot varus
Last to be corrected is Equinus

Above knee plaster weekly for 2 months, followed by Dennis Brown splint.
Night splint should be continued for 5 years

70% needs an Achilles tenotomy
SPLATT at 3 years: Split tibialis anterior transfer if the deformity is present in swing phase in 30%
10-20% may need compressive extensive [cincinatti release]

FACTS 50% of newborn club feet can be corrected by non-operative means

50% had no dorsi-flexion beyond neutral

50% needed further surgery after soft tissue release

Most series report 75 - 90% satisfactory results of operative treatment

Recurrence rates of deformity is 25%

COMPREHENSIVE RELEASE [CINCINATTI RELEASE]

Informed consent

Explain about permanent calf atrophy. The foot will be always small
Deformity can recur, needing further surgery
May need SPLATT: Dynamic means muscle imbalance
Irrespective of good surgical correction, patient may have decreased physical endurance
[Sports, walk, run, squatting, jump, stairs]

Principle 4 regions:
Posterior release
Medial release
Plantar release: Plantar fascia

Lateral release: Calcaneo-Cuboid joint

Cincinatti approach
Skin incision Head of the I Metatarsal, Below medial malleolus then above the heel crease, below the lateral malleolus to the base of the V Metatarsal
Identify and preserve the neurovascular bundle [posterior tibial artery and nerve] and the sural nerve. Take care to preserve the medial calcaneal branch of the post tibial nerve

Release all tight structures
Z lengthen: Achilles tendon, Tibialis Posterior, FDL and FHL
Release posterolateral corner [posterior fibulo-talar ligament], peroneal sheath
Release tibio-fibular syndesmosis
Superficial Deltoid ligament but retain deep
Capsulotomy of Posterior subtalar and ankle joint
Capsulotomy of Talonavicular joint (capsulotomy medially, superiorly, inferior)
Rarely release calcaneo-cuboid joint and interosseous ligament between calcaneus and talus
Reduce talo-navicular joint and fix with a K wire

Complications
Infection (rare) ;Wound breakdown
Ischaemia: Dorsalis Pedis Artery may be absent in CTEV.
Overcorrection or under correction
Recurrence of deformity in 40%
Stiffness
Persistent intoeing is quite common which is not due to tibial intorsion but rather insufficient
external rotation correction of the subtalar joint

Revision surgery: 25% of the feet have a recurrence
<2 yrs: Repeat complete soft tissue releases
2-4 yrs: cuboid enucleation [shorten lateral column + Medial soft tissue release]
>4 yrs: open medial wedge + close lateral wedge

Salvage surgeries
Forefoot equinus: Metatarsal osteotomy is better than Heyman's capsulotomy of MTP
because of high rate of recurrence]

Forefoot supination SPLATT [Gaceau] split tibialis anterior

Residual cavus Steindler's release

Hindfoot varus Calcaneal osteotomy

Forefoot adduction Calcaneocuboid aarthrodesis

IV Current concepts

DDH JAAOS J Am Acad Orthop Surg 1999;8:232-242

Abstract

The term .developmental dysplasia or dislocation of the hip. (DDH) refers to the complete spectrum of abnormalities involving the growing hip, with varied expression from dysplasia to subluxation to dislocation of the hip joint. Unlike the term .congenital dysplasia or dislocation of the hip,. DDH is not restricted to congenital problems but also includes developmental problems of the hip. It is important to diagnose these conditions early to improve the results of treatment, decrease the risk of complications, and favorably alter the natural history. Careful history taking and physical examination in conjunction with advances in imaging techniques, such as ultrasonography, have increased the ability to diagnose and manage DDH. Use of the Pavlik harness has become the mainstay of initial treatment for the infant who has not yet begun to stand. If stable reduction cannot be obtained after 2 weeks of treatment with the Pavlik harness, alternative treatment, such as examination of the hip under general anesthesia with possible closed reduction, is indicated. If concentric reduction of the hip cannot be obtained, surgical reduction of the dislocated hip is the next step. Toward the end of the first year of life, the toddler.s ability to stand and bear weight on the lower extremities, as well as the progressive adaptations and softtissue contractures associated with the dislocated hip, preclude use of the Pavlik harness.

The term .developmental dysplasia or dislocation of the hip. (DDH) refers to the complete spectrum of abnormalities involving the growinghip, with varied expression from dysplasia to subluxation to dislocation of the hip joint. Unlike the traditional term .congenital dysplasia or dislocation of the hip,. The designation DDH has been officially endorsed by the American Academy of Orthopaedic Surgeons, the American Academy of Pediatrics, and the Pediatric Orthopaedic Society of North America because it is not restricted to congenital dislocation of the hip and includes developmental problems of the hip.1,2 This more comprehensive term refers to alterations in hip growth and stability in utero, in the newborn period, and in the neonatal period that may result in dysplasia, ranging from subluxation to dislocation of the joint. Although congenital dysplasia or dislocation of the hip is the most common subset of disorders under the rubric DDH, the term also refers to hip disorders associated with neurologic disorders (e.g.,myelomeningocele), connective tissue disorders (e.g., Ehlers-Danlos syndrome), myopathic disorders (e.g., arthrogryposis multiplex congenita),and syndromic conditions (e.g., Larsen syndrome). None of the hip abnormalities associated with those less common conditions is precisely or adequately addressed by the term congenital dislocation of the hip. The term .dysplasia. denotes an abnormality in development, such as an alteration in size, shape, or organization. Hip-joint dysplasia refers to alterations in the structure of the femoral head, the acetabulum, or both. The well-developed cup-shaped structure is absent in acetabular dysplasia and is replaced by a shallow saucer-shaped acetabulum that is not congruent with thefemoral head. Dysplasia of the infant femoral head is difficult to evaluate radiographically because the proximal femoral ossific center does not appear until 4 to 7 months of age. Technological advances and increased experience with ultrasonographic evaluation of the infant hip have improved our understanding of the structural changes that may exist in the cartilaginous portions of the femoral head and acetabulum. Congruent stability of the femoral head within the acetabulum is essential for normal growth and development of the hip joint.The term .dislocated hip. Indicates that the femoral head has been displaced from the confines of the acetabulum. In most instances, the femoral head lies posterosuperior to the acetabulum. A dislocated hip may be reducible or irreducible. A dislocatable hip is one in which the femoral head is located within the acetabulum but can be completely displaced from it by the gentle application of posteriorly directed forces to the hip positioned in adduction. When a similar maneuver is performed with resultant gliding of the femoral head, which remains within the confines of the acetabulum, the hip joint is unstable and is thus termed .subluxatable.

Etiology and Causative
Factors

One in 1,000 children is born with a dislocated hip, and 10 in 1,000 children are born with hip subluxation or dysplasia. The condition occurs with greater prevalence in Native Americans and Laplanders and is rarely seen in infants of African descent. Cultural traditions, such as swaddling of the infant with the hips together in extension, have been implicated as important causative factors in these groups. Eighty percent of affected children are female.The left hip is affected in 60% of children, the right hip in 20%, and both hips in 20%. It is believed that the left hip is more frequently involved because it is adducted against the mother.s lumbosacral spine in the most common intrauterine position (left occiput anterior); in that position, less cartilage is covered by the bone of the acetabulum, and instability is, therefore, more likely to develop. Females may be affected more frequently because of the increased ligamentous laxity that transiently exists as the result of circulating maternal hormones and the additional effect of estrogens that are produced by the female infants uterus. Developmental dysplasia or dislocation of the hip occurs more often in infants who present in the breech position, whether delivered vaginally or by cesarean section. The in utero knee extension of the infant in the breech position results in sustained hamstring forces about the hip with subsequent hip instability. While breech presentation occurs in fewer than 5% of newborns, Dunn3 and Barlow4 noted breech position in 32% and 17.3%, respectively, of children with DDH. Twice as many female infants as male infants present in the breech position, and 60% of breech presentations are noted in firstborn children. Firstborn children are affected twice as often as subsequent siblings, presumably on the basis of an unstretched uterus and tight abdominal structures, which may compress the uterine contents. Postural deformities and oligohydramnios are also associated with DDH. The probability of having a child with DDH in at-risk families has been determined by Wynne-Davies: 6% if there are normal parents and one affected child, 12% if there is one affected parent but no prior affected child, and 36% if there is one affected parent and one affected child.

Pathologic Anatomy

The secondary changes observed in the hip joint reflect significant soft tissue contracture and alterations in normal growth of the femoral head and acetabulum. The most consistent finding in DDH is a shallow acetabulum with persistent femoral anteversion. The longer the femoral head remains out of the acetabulum, the more severe the acetabular dysplasia and the greater the femoral head distortion. Persistent subluxation of the hip results in progressive deformation of both the acetabulum and the femoral head.Soft-tissue adaptations develop at the labrum, limbus, ligamentum teres, pulvinar, transverse acetabular ligament, iliopsoas tendon, and hip-joint capsule. The acetabular labrum, a fibrocartilaginous structure located at the acetabular rim, enhances the depth of the acetabulum by 20% to 50% and contributes to the growth of the acetabular rim.In the older infant with DDH, the labrum may be inverted and may mechanically block concentric reduction of the hip. The limbus, which is frequently confused with the labrum, represents a pathologic response of the acetabulum to abnormal pressures about the hip. With superior migration of the femoral head, the labrum is gradually everted, with capsular tissue interposed between it and the outer wall of the acetabulum. Mechanical stimulation results in the formation of fibrous tissue, which merges with the hyaline cartilage of the acetabulum at its rim. The resultant structure, the limbus, may then prevent concentric reduction of the hip.The status of the labrum is best evaluated by arthrographic studies of the hip or by magnetic resonance (MR) imaging. Surgical excision ofthe labrum will result in persistent alterations in acetabular growth.Closed reduction of the dislocated hip with an inverted labrum has been associated with increased prevalence of avascular necrosis of the femoral head, perhaps secondary to increased intra-articular pressure.

Developmental Dysplasia of the Hip

The blood vessels of the ligamentum teres provide minimal circulation to the femoral head. However, in persistent dislocation of the hip, the ligamentum teres lengthens, hypertrophies, and may block concentric reduction of the femoral head in the acetabulum. Fibrofatty tissue, known as the pulvinar, may be found within the depths of the acetabulum and may prevent acceptable reduction of the femoral head within the acetabulum. Closed reduction of the femoral head within the acetabulum will result in spontaneous recession of the pulvinar.Open reduction of the fixed dislocated hip joint involves resection of the ligamentum teres and the pulvinar to ensure congruent reduction.The transverse acetabular ligament, located at the caudal perimeter of the acetabulum, contracts in patients with persistent hip dislocation and is a major block to concentric reduction of the hip. Incising the transverse acetabular ligament is essential for complete reduction of the hip joint. With long-standing dislocation, the stretched hip capsule becomes constricted by the contracted iliopsoas tendon to assume an hourglass configuration that prevents reduction. In summary, any of the following structures or conditions may be a block to concentric reduction in the patient with DDH: inverted labrum, presence of a limbus, hypertrophied ligamentum teres, pulvinar, contracted capsule, contracted transverse acetabular ligament, and contracted iliopsoas.

Physical Examination

All newborn infants are examined by a physician in the nursery. The history obtained at that first evaluation includes gestational age, presentation (breech versus vertex), type of delivery (cesarean versus vaginal), sex, birth order, and family history of hip dislocation, ligamentous laxity, or myopathy. There is a higher prevalence of DDH in breech babies, girls, firstborn infants, and those with a positive family history of DDH, hyperlaxity syndromes, and myopathies.

The baby should be relaxed and examined in a warm, quiet environment with removal of the diaper. A general examination, beginning at the head, should be done to detect conditions that are associated with an increased prevalence of DDH,such as torticollis, congenital dislocation of the knee or foot, lowerextremity deformities, and ligamentous laxity.5,6 A baseline neurologic evaluation to assess motor impairment or alterations in muscle tone is necessary. Spine deformity or midline spinal cutaneous lesions, such as a sinus, hemangioma, or hairy patch, may suggest the existence of underlying spinal anomalies. Evaluation of the hip begins with observation of both lower extremities for asymmetric inguinal or thigh skin folds (Fig. 1, A) or femoral shortening. The Galeazzi, or Allis, sign is elicited by placing the child supine with the hips and knees flexed. Unequal knee heights suggest congenital femoral shortening or dislocation of the hip joint (Fig. 1,B). Bilateral hip dislocation may be present and may not reveal asymmetry of femoral length or hip-joint motion. An infant with unilateral hip dislocation will eventually exhibit limited hip abduction on the affected side but perhaps not for several months (Fig. 1, C).Each hip is examined individuallywith the opposite hip held in maximum abduction to lock the pelvis. Gentle, repetitive passive motion of the hip joint will allow detection of subtle instability. Marked limitation of motion of the hip joint in the newborn period with irreducible hip dislocation is evidence of a Teratologic hip dislocation due to syndromic, genetic, or neuromuscular causes. Soft-tissue clicks felt whileadducting or abducting the hip in the absence of other abnormal findings are considered benign.7 The Ortolani and Barlow tests are performed to evaluate hip stability.-

A B C

Figure 1 Clinical evaluation for DDH. A, Asymmetric thigh-skin folds. B, A positive Galeazzi sign indicates femoral shortening on the patient's left side. C, Limited abduction of the left hip.

The infant must be examined in a relaxed state while positioned supine on a firm surface. Each hip is examined separately. To perform the Ortolani test on the left hip, the examiner.s right hand gently grasps the left thigh with the middle or ring finger over the greater trochanter and the thumb over the lesser trochanter (Fig. 2, A). The examiner .s left hand is used to stabilize the infant.s right hip in abduction. The examination is initiated by slowly and gently abducting the left thigh while simultaneously exerting an upward force on the left greater trochanter. Abduction of each hip should be symmetric. The sensation of a palpable .clunk. when the Ortolani maneuver is performed represents mechanical reduction of the femoral head into the confines of the acetabulum, signifying a dislocated but reducible hip. The process is then repeated on the right hip with the left hip locked against the pelvis in abduction.The infant is positioned similarly for performance of the Barlow test;however, the thumb is positioned at the distal medial thigh and is used to apply a gentle lateral and downward force at the hip joint in an attempt to dislocate the femoral head from the acetabulum (Fig. 2, B). When the hip is displaced from the acetabulum, the hip is described as dislocatable. When the Barlow test results in positioning of the femoral head within the confines of the acetabulum, the hip is described as subluxatable. After the age of 3 months, the Ortolani and Barlow tests become negative as progressive soft-tissue contracture evolves.

Radiologic Examination

In the normal newborn with clinical evidence of DDH, routine radiography of the hips and pelvis may be confirmatory, but a normal radiograph does not exclude the presence of instability. If fixed dislocation and limited abduction are noted in the hip, an anteroposterior radiograph of the hips and pelvis is indicated to evaluate for Teratologic dislocation of the hip and to rule

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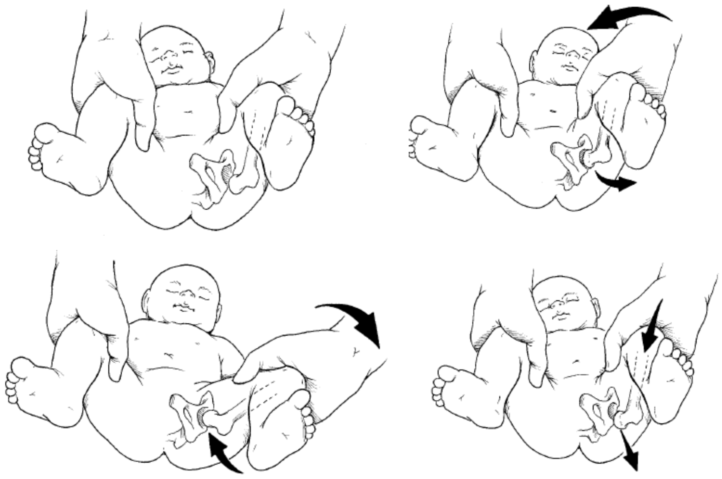
out congenital anomalies of the proximal femur, pelvis, or caudal spine. Abnormal findings on the radiograph may confirm or suggest a diagnosis, but a normal radiograph does not exclude the presence of instability. If subluxation of the hip is suspected, dynamic ultrasonography of the hip joint by an experienced ultrasonographer may be used to confirm the diagnosis.Radiographic evaluation is most reliable when the infant is relaxed and placed supine on the examination table. The pelvis must be neutral to the table with the lower extremities held in neutral abduction-adduction and the hips in slight flexion to reproduce the physiologic hip-flexion contracture.If the pelvis is rotated to one side, the anteroposterior radiograph will demonstrate asymmetry of the obturator foramina, with the spurious finding of deficient acetabular coverage of one hip and normal coverage of the opposite hip. If the physiologic hip-flexion contracture is not respected and the lower extremities are forced down on the

examination table, the pelvis will rotate anteriorly and will give the appearance of distorted acetabular anatomy.
Several reference lines and angles may be helpful in the critical evaluation of the AP radiograph of the infant.s pelvis (Fig. 3).Hilgenreiner.s line is a line drawn horizontally through each triradiate cartilage of the pelvis. Perkins. line is drawn perpendicular to Hilgenreiner .s line at the lateral edge of the acetabulum, which may be difficult to identify in the dysplastic hip. The femoral head should lie within the inferomedial quadrant formed by Hilgenreiner.s and Perkins. lines. Shenton.s line is a continuous arch drawn along the medial border of the neck of the femur and the superior border of the obturator foramen. Displacement of the femoral head or severe external rotation of the hip will result in a break in the continuity of Shenton.s line.



The acetabular index is calculated by drawing an oblique line through the outer edge of the acetabulum tangential to Hilgenreiner.s line. In the newborn, the normal value averages 27.5 degrees; an index greater than 35 degrees may herald acetabular dysplasia. In addition to the numeric acetabular index, the absence of a sharply defined lateral edge of the acetabulum may suggest dysplasia. When the proximal femoral ossification center is present, the centeredge angle may be calculated. A line is drawn vertically through the center of the femoral head and perpendicular to Hilgenreiner.s line. A second line is drawn obliquely from the outer edge of the acetabulum through the center of the femoral head. The resulting center-edge angle reflects both the degree of acetabular coverage of the femoral head in acetabular dysplasia and the degree of femoral head displacement in the unstable hip. A center-edge angle less than 20 degrees is considered abnormal and may be associated with acetabular dysplasia or subluxation of the hip. The values obtained by these methods are not absolute and must be considered in conjunction with the entire history and physical examination.

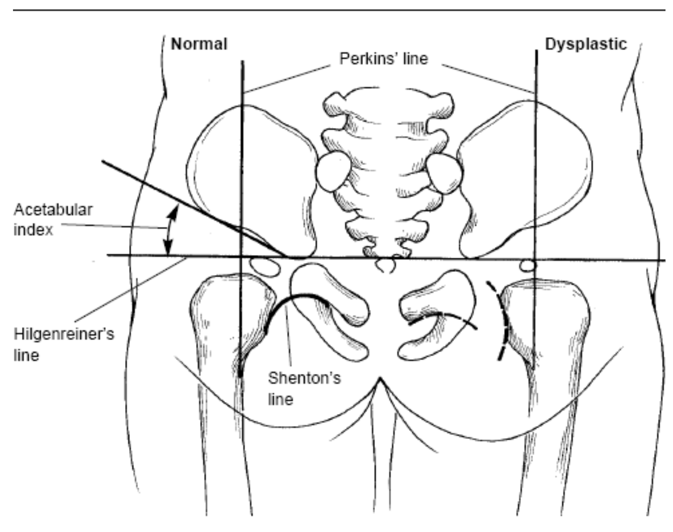


Figure 3 Reference lines and angles useful in the evaluation of DDH.

Weintroub et al8 studied the growth and deve lopment of congenitally dislocated hips that were reduced early in infancy and compared the results with the growth and development of a group of normal hips. In 56 normal hips in children between the ages of 3 and 6 months, the mean acetabular index was 21 degrees (range, 15 to 30 degrees; SD, 3 degrees), and the mean center-edge angle was 21 degrees (range, 12 to 30 degrees; SD, 6 degrees). In 36 abnormal hips in the same age group, the mean acetabular index was 38 degrees (range, 29 to 48 degrees; SD, 6 degrees), and the mean center-edge angle was 9 degrees (range, 5 to 13 degrees; SD, 6 degrees). The authors reported that the acetabular index was reproducible in all studied age groups, but that the center-edge angle in children less than 3 years old is difficult to measure due to incomplete or irregular ossification of the femoral head and should be reserved for children older than 5 years. Delay in the appearance of the ossific nucleus of the proximal femur in DDH is expected in persistent instability of the hip joint or as the result of an avascular insult following intervention. Persistent subluxation or dislocation of the hip results in widening of the acetabular .teardrop.. The lateral line of the teardrop represents the cortical surface of the acetabular fossa. The medial line represents the medial cortex of the pelvic wall at the posterior margin of the acetabulum.The observation of widening of the teardrop as the child grows may suggest low-grade instability that is not clinically apparent.In the past two decades, dynamic ultrasonography of the infant hip before the appearance of the proximal femoral ossific center has advanced evaluation and understanding of DDH. Ultrasonography is capable of visualizing the cartilaginous anatomy of the femoral head and acetabulum without ionizing radiation. Graf.s pioneering studies produced static measurements of normal infantile hip anatomy, and Harcke.s dynamic hip ultrasonographic techniques provided clinically relevant information for critically evaluating the stability of the hip. Ultrasonography is useful in confirming subluxation of the hip, identifying dysplasia of the cartilaginous portion of the acetabulum, and documenting reducibility and stability of the hip in the infant undergoing treatment with the Pavlik harness. When reduction of the hip is maintained by a spica cast, ultrasonography of the hip requires a large window, which is destabilizing and therefore should be avoided. Appearance of the proximal femoral ossification center will interfere with ultrasound evaluation of the hip joint. Patients treated for hip instability may demonstrate delay in the appearance of the proximal femoral ossification center as long as 1 year after hip reduction. The delay in ossification of the femoral head in this population allows continued utilization of ultrasonography in the evaluation of hip stability. Computed tomography of the hip is effective in evaluating hip position in a spica cast after closed or open reduction.11 Radiographs of the hips and pelvis may be obscured by a hip spica and may not clearly demonstrate posterior subluxation of the femoral head. Computed tomography is able to more precisely document concentric hip reduction. In addition, the presence of excessive hip abduction, which may be associated with the development of avascular necrosis of the femoral head, can be more critically evaluated.

The role of MR imaging in the management of DDH has not yet been defined.12 Although MR imaging allows visualization of soft tissue anatomy, it offers no substantial advantage over standard imaging techniques.

Arthrographic evaluation of the hip demonstrates the cartilaginous anatomy of the acetabulum and femoral head and is a dynamic test to evaluate the stability and quality of reduction. Arthrography plays an important role in deciding between closed and open reduction in older infants and toddlers.

Treatment

Debate continues concerning which abnormal hips actually require active intervention. Subluxation of the hip at birth often corrects spontaneously and may be observed for 3 weeks without treatment. The triple-diaper technique, which prevents hip adduction, is still utilized but has demonstrated no improvement in results compared with no intervention at all in the first 3 weeks of life. When evidence of subluxation of the hip persists beyond 3 weeks on physical examination or ultrasonographic evaluation, treatment is indicated. When actual hip dislocation is noted at birth, treatment is indicated without need for an observation period

(Fig. 4).

Various devices have been used for the treatment of hip instability in infants, including hip spica casts, the Frejka pillow, the Craig splint,the Ilfeld splint, and the von Rosen splint. These devices are not commonly used as initial treatment today and have been replaced almost exclusively in the United States by the Pavlik harness.

Pavlik Harness

The Pavlik harness was introduced in eastern Europe in 1944 and has been used in the United States for more than 30 years (Fig. 5). The harness is a dynamic positioning device that allows the child to move freely within the confines of its restraints. It consists of a circumferential chest strap with shoulder straps that provide sites of attachment for lower-extremity straps. The function of the anterior lowerextremity straps is to flex the hips, whereas the posterior lower-extremity straps prevent adduction of the hips. The posterior lower-extremity straps should not be used to produce abduction of the hips, which is associated with avascular necrosis. Indications for use of the Pavlik harness include the presence of a reducible hip in an infant who is not yet making attempts to stand. The child.s family must be able to follow instructions and be available for frequent evaluations and harness adjustments. When radiographs of the hips and pelvis in flexion and abduction indicate that the femoral neck axis and head are directed toward the triradiate cartilage but the hip is not

fully reduced, the Pavlik harness may be used. Positioning of the hips in

flexion with limitation of adductionwill permit stretching of the adductors with gradual .docking. of the femoral head within the acetabulum.This group of patients must be followed up closely at weekly intervals to avoid complications. If the hip is not reduced n 2 weeks by this technique, other methods of treatment should be pursued. A general rule of thumb for time in treatment when the hip is successfully reduced is the child.s age at hip stability plus 3 months. Therefore, if a child begins treatment at the age of 6 months and the hip quickly stabilizes, the total duration of all treatment would be approximately 9 months. The following treatment protocol is commonly utilized for children from birth to the age of 6 months.

The Pavlik harness is initially applied and adjusted by the treating physician. Evaluation is done on a weekly basis, and a radiograph or sonogram of the hips in the harness is obtained when there is full range of motion (Fig. 6). If the hip is not reduced and stable by 2 weeks, other treatment options should be considered. If the hip is stable and reduced at 2 weeks, follow-up visits to confirm continuing stability of the hips in the Pavlik harness and to adjust the harness straps are scheduled every 2 weeks. The harness is worn fulltime for half of the treatment time.

Weaning may be initiated at the midpoint of treatment if there is both clinical and radiographic evidence of stability. At the midpoint of the treatment program, the child is taken out of the Pavlik harness the night before the office visit, and a radiograph of the hips and pelvis out of the harness is obtained the following day. If the findings from the clinical examination and radiographs are consistent with hip stability, weaning from the harness is initiated with the child out of the harness for 4 hours a day for the first third of the remaining treatment period. Reevaluation is at 2-week intervals. If stability is maintained,the child is progressively weaned out of the harness 8 hours a day for the next third of the weaning period and as long as 12 hours a day for the final third of the weaning period.

An anteroposterior radiograph of the hips and pelvis is obtained at the end of the weaning process. Ifthe hip is radiographically normal, the harness is discontinued. If residual acetabular dysplasia exists, the harness is worn for 12 hours a day until the dysplasia resolves on radiographic evaluation. When the child begins to pull to stand, an Ilfeld brace is substituted for the Pavlik harness and is used until the hip is radiographically normal.Ramsey et al13 reported the results of treatment of 27 dislocated hips in 23 children who were less than 6 months old. The clinical and radiographic criteria for use of the Pavlik harness included the ability to direct the femoral head toward the triradiate cartilage. Twentyfour dislocations were successfully reduced, and all were clinically and radiographically normal at followup with no evidence of Avascular necrosis. The authors introduced the concept of the .safe zone,. which is the difference in degrees between the angle of maximal passive hip abduction and the angle of hip adduction at which the femoral head displaces from the acetabulum with the infant.s hips examined in 90 degrees of flexion. Recently, flexion and extension have been added to the hip examination to describe the safe zone. The most common cause of failure of reduction in their series was inadequate hip flexion within the Pavlik harness.

Transient femoral neuropathy due to persistent hyperflexion of the hips in the harness was demonstrated in 1 patient. Kalamchi and MacFarlane14 later reported on 21 patients with hip dislocation and 101 patients with hip dysplasia who were treated at an average age of 5 months. Reduction with use of the Pavlik harness was successful in 97% of patients, with no cases of Avascular necrosis. Five dislocated hips in 3 children required closed or open reduction for successful treatment of hip instability; concentric reduction was achieved in all cases. At an average follow-up of 5 years, all hips were clinically and radiographically normal.

Iwasaki15 reported the results of treatment of dislocated hips with the Pavlik harness in two groups of patients based on location of treatment: home versus hospital. The rate of avascular necrosis was 7.2% for the outpatients and 28% for inpatients.Iwasaki attributed Avascular necrosis to forced abduction maneuvers to achieve reduction.

The posterior straps of the Pavlik harness should not be used to forcibly abduct the hips but merely to limit adduction to achieve positioning within the safe zone. Harding et al16 reported on 47children with 55 dislocated hips who were monitored with ultrasonography during the course of their treatment with the Pavlik harness.

Diagnosis and initiation of treatment before the age of 3 weeks increased the chance of a successful result; 63% of children treated with the Pavlik harness before the age of 3 weeks achieved reduction, compared with 20% of children treated after the age of 3 weeks. If reduction was not obtained after 3 weeks of harness use, the harness was abandoned. Although other authors have experienced difficulty with subsequent treatment methods if failed Pavlik harness treatment extended past 3 weeks, it was not seen in this study. No anatomic factors were seen at the initial examination by ultrasonography that could predict which hips would have a successful result; however, at the 1- and 2-week evaluations, prognostic information could be gleaned from the sonograms as to which hips were responding to harness treatment and were likely to have a successful result.

Harris et al17 reported on 720 dislocated or subluxated hips in 550 patients less than 1 year old who were treated with the Pavlik harness. Eleven percent of the hips proved irreducible by the harness and required other treatment methods. Avascular necrosis occurred in 5 hips (0.7%) treated with the Pavlik harness. Transient irritation and decreased range of motion occurred in 8 hips (1%) while in the harness. At the end of the period of harness treatment, 9% of hips had evidence of acetabular dysplasia, compared with 5% of hips that still displayed dysplasia at an average follow-up of 26 months. Acetabular dysplasia was defined as an acetabular index greater than 30 degrees or more than 8 degrees greater than that of
the contralateral hip.

A number of factors may contribute to failure of Pavlik harness treatment, including lack of parental compliance. McHale and Corbett18 reported parental difficulties with bathing, dressing, and the use of a standard car seat for children using the Pavlik harness. One of the four failures of treatment in their series could be attributed to parental noncompliance. No correlation was made with parental age, education, or socioeconomic status. Mubarak et al19 reported on 18 children with DDH who developed problems during treatment with the Pavlik harness. The most common problems were improper use of the harness by the physician, resulting in failure to obtain reduction of the dislocated hip, and failure of the physician to recognize that the hip was not reduced. In 6 patients, the problems were attributed to parental noncompliance. Poor quality and construction of the harness also contributed to the problems of the physician and parents. There may be a subset of patients for whom failure of reduction with use of the Pavlik harness can be predicted on the basis of anatomic reasons. Viere et al20 reported their experience with Pavlik harness treatment of 30 hips in which reduction could not be obtained or maintained. A statistically significant relationship was noted in patients with an absent Ortolani sign at initial evaluation, patients with bilateral dislocation, and patients in whom Pavlik harness treatment commenced after the age of 7 weeks.All 30 hips were then treated with Bryant traction followed by attempted closed reduction. Fifteen hips were successfully reduced, but 2 later redislocated and required open reduction. Fifteen hips required open reduction, 2 of which later redislocated and required repeat open reduction. Two hips (7%) in the series developed Avascular necrosis after closed reduction. Suzuki and Yamamuro21 reported on Pavlik-harness treatment of 233 dislocated hips and 37 hips with acetabular dysplasia in 220 patients. Of the 233 dislocated hips, 220 were reduced in the harness. Thirty-six of the reduced hips (16%) developed avascular necrosis. Only one of the 37 hips with acetabular dysplasia developed avascular necrosis. The authors concluded that severe hip dislocation may be associated with failure of reduction or with the development of avascular necrosis in the reduced hip.

Difficulty with reduction in a Pavlik harness may be due to prolonged dislocation in a flexed and abducted position, which may cause posterolateral acetabular dysplasia. Jones et al22 recommend abandonment of the Pavlik harness if reduction is not achieved after 4 weeks of treatment.

In their series of 19 patients with 28 dislocated hips, 8 weeks of Pavlik harness treatment failed to reduce the hip, and 13 patients (17 hips) required open reduction.

In one series of male infants with DDH, only 2 of 30 hips (7%) initially treated with the Pavlik harness had a successful result.23 The remaining 28 hips required closed or open reduction.

Avascular necrosis developed in 2 hips and was treated with secondary closed reduction and hip spica casting.

Closed Reduction and Spica
Casting

Closed reduction with examination of the hips under general anesthesia is reserved for those children in whom concentric reduction cannot be achieved with simpler methods.

If stable concentric reduction of the hip joint is not attained after a trial period of 3 weeks in the Pavlik harness, this method should be abandoned. Closed reduction and hip spica casting may also be the treatment of choice for a patient with an unreliable family or unfavourable social situation.

Five of the nine boys in the series of Forlin et al25 underwent closed reduction when they were less than 6 months old, whereas only 10 of the 52 girls who underwent closed reduction were less than 6 months old. These authors found no statistically significant difference between age at the time of closed reduction and the distribution of hips with a good, fair, or poor result.

In a series of 47 hips reported by Kahle et al,26 11 hips (23%) in nine patients were treated with closed reduction when the child was between birth and 6 months old. No patient had avascular necrosis or required a later reconstructive procedure. However, five patients required a primary open reduction; two patients, a secondary open reduction. The authors found it more difficult to maintain a closed reduction in this young age group, as it is technically demanding to apply a hip spica cast on a small child, especially one with bilateral hip dislocations.

Ishii and Ponseti27 reviewed the data on 32 patients with 40 dislocated hips that were treated by closed reduction before the age of 1 year. Nineteen hips were reduced between the ages of 2 and 6 months (group I). Four of these 19 hips demonstrated .mild. Avascular necrosis at last follow-up. Eight of the 21 hips reduced after the age of 6 months (group II) demonstrated .severe. avascular necrosis at followup. Sixty percent of the improvement in the acetabular index was seen in the first year after reduction in both groups. In group I, the acetabular index improved at a slow pace during the following 4 years and then minimally thereafter. In group II, the acetabular index improved more slowly than in group I, but continued until skeletal maturity. The center-edge angle improved in the first year after reduction in both groups, and improved more rapidly after this in group I patients. Superior results were seen in those hips reduced before the age of 6 months. In the series of Malvitz and Weinstein,28 22 hips had been reduced when the child was less than 6 months old, and all had an excellent functional result at the time of follow-up. These hips had fewer degenerative changes, fewer instances of late subluxation, and less avascular necrosis than hips treated after 6 months of age. Avascular necrosis was more severe when it occurred in younger children, which supported the observations of Luhmann et al29 that the immature cartilaginous femoral head is more vulnerable to ischemia than the femoral head in which the ossific nucleus is present.

Open Reduction

Open reduction of the hip joint is rarely required in this age group but is indicated for children in whom a stable concentric reduction cannot be achieved by closed methods.

The anatomy of the hip permits open reduction via the anterior or the medial approach. Open reduction of the hip in this age group is usually reserved for hips with teratologic abnormalities.

Summary

Early diagnosis is of paramount importance to efforts to favourably alter the natural history of DDH. Most cases of DDH can be diagnosed on the basis of careful history taking and physical examination. Imaging modalities, such as ultrasonography, have increased our ability to detect subtleties not appreciated by means of physical examination or plain radiography. Treatment with the Pavlik harness remains the standard of care for most children less than 6 months of age, with a success rate greater than 90% and few complications. In the event that Pavlik-harness treatment is unsuccessful, closed reduction under general anesthesia with arthrographic control is indicated. Superior results and lower rates of avascular necrosis are seen when the hip is reduced early. In the rare instance when a stable concentric reduction cannot be obtained at the time of closed reduction, an open reduction should be performed. Serial clinical and radiographic evaluations of the hip are necessary until skeletal maturity in order to monitor for growth disturbance of the femoral head and acetabular dysplasia.

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V. MCQ

True or False

1.With respect to anatomy of the hand:

a.Important pulley in flexor sheath: A1 and A3 [ ]

b.Blood to tendon is maximum:over dorsal aspect [ ]

c.Less disruption of vicula of FDP with repair of FDP alone and excision of FDS in Zone II [ ]

d.Pulley implicated in trigger finger is A1 [ ]

e.Dorsal interossie takes origin from from tendon and is inserted to tendon [ ]

2**.Anatomy of the forearm**

a. Mobile wad: Brachioradialis, ECRLand ECRB [ ]

b Mobile wad is supplied by radial nerve [ ]

c. Anterolateral approach of Henry for radius is between Mobile wad and Flexor compartment

d. Lateral cutaneous N of the forearm is a br Musculocutaneous nerve is at risk during anterior elbow approach [ ]

e. Median nerve runs deep to Pronator teres while ulnar artery runs between two heads of Pronator teres [ ]

3.Ossification

a. Capitate at the wrist appears during II Intra-uterine life [}

b. Scaphoid appears at 6 months

c.Distal end of radius and ulna appear earlier than proximal end and fuse late [ ]

d.Capitulum centre appears at 5 years [ ]

e.Lateral epicondyl is last to appear [ ]

4. **Hand anatomy**

a.Lunula is at the base of the nail plate which represents Germinal matrix which contribute to the Nail development? [ ]

b.Last muscle to be innervated by Ulnar Nerve is Dorsal interosseus [ ]

c.One place where all 3 nerve: Maximal cross over? Dorsal aspect of Middle phalanx of the ring [ ]

d. Relation of nerve and artery in the finger:

- Nerve is posterior [ ]

e. Landsmear ORL is the Cerebellum of the hand and it cordinates PIP and DIP flexion

5. **Functional range**

a.Elbow: 30°-130° [ ]

b. Elbow Rotation 60° [ ]

c. Wrist palmar and Dorsiflexion is 40° [ ]

d. Normal position is wrist fusion 15° of Dorsiflexion [ ]

e.Weight transmission: 50% through the radial fossa, 30% through the lunate fossa and 20% through TFCC [ ]

Answer:

1 a=F [A2,4]; b=T; c= F; d=T; e=F[Lumbricals]

2. a=T; b=T ; c=T; d=T; e=F [Median N runs between 2 heads of Pronator Teres]

3.a=T; b=F [6years]; c=T; d=F[appears at 2 years]; e=T

4.a=T; b=T; c=T; d=F [Nerve is anterior]; e= T

5.a=T ; b=F[50] ; c=T ; d=T ; e=T .