Management of the Sequelae of Septic Arthritis

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Background

- Septic arthritis common in South Africa
- Often presents late
- Subtypes
  - Subacute – ‘encapsulated’ - Biopsy
  - Chronic – pus, granulation tissue, sinus – as for acute infection principles
  - Burnt out
- Serious sequelae
  - Difficult to manage
Clinical Presentation

- Systemic - Other organs / other joints
- Joints usually painless
- Deformity
- Ankylosis
- Leg length discrepancy
- Joint instability
Systemic Sequelae

- Toxic shock syndrome, multi-organ failure
  - Hoffman et al, 1990
  - 38/468 had disseminated staphylococcus infections

General Sequelae

• Multifocal bone & joint sepsis - 8/80 cases
  • Poor outcome due to
    1. Delayed treatment
    2. Initial misdiagnosis
    3. Not related to maternal education level nor distance from hospital

Management of Systemic Sequelae

- Cerebral – infarcts, haemorrhage
- Pulmonary – Pneumonia (S Aureus), ARDS
- Cardiovascular – shock (septic or haemorrhagic), pericardial effusion
- Deep vein thrombosis / pulmonary embolus
- Haematological – Hb, platelets, WCC, DIC
- Renal failure
General Orthopaedic Sequelae
Septic Arthritis

- Fractures
- Pseudarthrosis
- Coxa vara/valga/magna/breva
- Growth arrest – partial or complete
- Complete destruction / Tom Smith hip
Sequelae
Growth Arrest

11 Year old girl with 11cm LLD after left knee neonatal septic arthritis, had genu varus corrected with Circular Frame and 5cm lengthening
Overall Objectives of Treatment

• Treat residual infection
• Improve symptoms
• Improve function
• Clinical assessment more NB than X-Rays
Management of Orthopaedic Sequelae

• Emphasis on hip
Sequelae
Hip Sepsis

• Cartilage necrosis
• Avascular necrosis of epiphysis
• Premature tri-radiate cartilage closure
• Acetabular dysplasia
• Premature / asymmetric physeal closure
• Subluxation / dislocation
• Pseudarthrosis
• Greater trochanteric overriding
• Complete destruction of femoral head and neck
Conservative Management
• Nine hips after 31 year follow up

• All dislocations (5) who were left alone
  • LLD BUT pain free with near normal ROM

• 2/3 open reductions severely disabled

• Favour contralateral epiphysiodesis
• 28 Patients (32 hips). Average follow up 42 years, mix of treatment

• Group I – Infantile (<3 months) – 19 hips (mean age one month)
  • 10 pain free, 5 mild pain, 4 moderate pain
  • Average Harris hip rating 79
  • 12 dislocated at follow up
    • Near normal ROM
    • Av 4cm LLD

• Group II – Childhood (>3 months) – 13 hips (mean age 6 years)
  • 9 pain free, 3 mild pain, 1 severe pain
  • Average Harris hip rating 69
• At 42 year follow up
  • Poor radiographic appearance, poor Harris rating
  • BUT pain & activity restriction minimal

• Fusion discouraged – all 3 had poor outcome

• Non operatively treated children had better function
Classifications of Septic Hip Sequelae

• Hunka 1982

• Choi 1990

• Forlin 2008
Hunka Classification 1982
Classification and Surgical Management of the Severe Sequelae of Septic Hips in Children

L. Hunka, M.D., F.R.C.S.(C), S. E. Said, M.D., F.R.C.S.(C),
D. A. MacKenzie, M.D., F.R.C.S., E. J. Rogala, M.D., F.R.C.S.(C),
and R. L. Cruess, M.D., F.R.C.S.(C)

CORR 1982

• Type I – Minimal head changes
• Type II – A. Intact growth plate, B. Destroyed growth plate
• Type III – Femoral neck pseudarthrosis
• Type IV – A. Complete destruction head, stable neck, B. Destruction head, unstable neck
• Type V – Complete destruction to I/T line
• Ten cases, av age 14 years, av 5 procedure each
• Variety of procedures
  • 8/10 satisfactory results
Type III hip with pseudarthrosis. Difficult to treat with BG – worst results
Choi Classification 1990
• 33 Hips, all under one year of age, 12 year follow up
• Worse outcome with prematurity, younger age & delay to treatment

• Type I – A. Transient ischaemia, B. Coxa magna
  • No reconstruction – abduction cast / brace for over a year
  • Satisfactory outcome 5/5
• Type II – A. Coxa breva, B. Coxa vara/valga
  • Femoral OT, contralateral epiphysiodesis
  • Satisfactory outcome 7/11
• Type III – A. Plus severe retro/anteversion, B. Pseudarthrosis
  • Femoral OT and BG
  • Satisfactory outcome 3/4
• Type IV – A. Small remnant of neck, B. Complete loss of head & neck
  • Pemberton, GT arthroplasty, tibial lengthening or observation
  • Satisfactory outcome 4/13
Forlin Classification 2008
Simpler & more reliable classification (41 hips)
Grade IA – Reduced with head preserved
Grade IB – Reduced with no femoral head visible
  • Correct dysplasia, improve congruency – Shelf or femoral OT
Grade IIA – Dislocated with head preserved
Grade IIB – Dislocated with no femoral head visible
  • Reconstruction – 15/20 had surgery – at 7 year FU – 8/15 satisfactory outcome
• 13 Year old boy. Left triple OT, then valgus OT
• Resulted in ankylosis and unsatisfactory result
Sequelae of Septic Arthritis of the Hip in Children
A New Classification and a Review of 41 Hips
Edilson Forlin, MD, MSc, PhD*† and Carlo Milani, MD, MSc, PhD‡§

• Shelf OT at 10 years & good outcome at 13.5 years
Other Hip Reconstruction Options

- Four Choi IV B Hips
- Age at surgery 9-13 years
- Lengthened femurs 4.5 – 13 cm after a hip stabilisation procedure (pedicle iliac crest graft)
- All decreased ROM, pin tract sepsis, one fracture
- Uncertain as to whether to recommend procedure

Nine year old vascularised BG bilaterally & lengthening, fractured
15 Patients, av age 21 years, Choi IV
All had pain and +ve Trendelenburg gait pre op
Ex fix applied for av 226 days – Ilizarov prox femoral OT and distal lengthening, av lengthening 5cm (1.5-10)
Follow up almost 10 years
Complications – common peroneal N palsy, 2 loss of correction, 3 knee subluxations,
  • 10 good / excellent, 3 fair, 2 poor outcomes
• 15 Patients, age 21 years
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• Ex-fix applied for av 226 days – Ilizarov prox femoral OT and distal lengthening, av lengthening 5cm (1.5-10)
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CORR 2002
Operative Reconstruction for Septic Arthritis of the Hip

In Ho Choi, MD*, Won Joon Yoo, MD, Tae-Joon Cho, MD, Chin Youb Chung, MD

Department of Orthopedic Surgery, Seoul National University Hospital, 28 Yongon-dong, Chongno-gu, Seoul 110–744, Korea

Determination of residual deformity of septic arthritis of the hip

Ultrasound, MRI, arthrogram

Type I
- realignment femoral osteotomy
  - observation and followup

Type II
- realignment femoral osteotomy
  - observation and followup

Type IIIA
- femoral valgus osteotomy, pseudarthrosis repair
  - reasonable size of cartilage cap over ossified remnant of femoral neck
    - open reduction, modified Harmon operation, distal transfer of greater trochanter
      - success
        - observation and followup
        - Ilizarov's hip reconstruction osteotomy
      - failure
        - Ilizarov's hip reconstruction osteotomy
    - < 6 years old
    - ≥ 6 years old

Type IIIB
- < 6 years old
- ≥ 6 years old

Type IVA
- < 6 years old
- ≥ 6 years old
- wait

Type IVB
- greater trochanteric arthroplasty, femoral varus osteotomy, acetabuloplasty
  - success
    - observation and followup
    - Ilizarov's hip reconstruction osteotomy
  - failure
    - observation and followup

Orthop Clin N Am 2006
Choi IV B. Trochanteric Arthroplasty
Choi IV B. Ilizarov Hip Reconstruction
Operative Reconstruction of the Severe Sequelae of Infantile Septic Arthritis of the Hip

Akifusa Wada, MD, PhD, Toshio Fujii, MD, Kazuyuki Takamura, MD, PhD, Haruhsa Yanagida, MD, Noriko Urano, MD, and Panya Surijamorn, MD

JPO 2007

• 21 Patients (13 MRSA)
  • 11 Choi III A – OR, femoral / pelvic OT – 8/11 successful
  • 4 Choi III B – femoral valgus OT & BG – 2/4 successful
  • 6 Choi IV A/B – GT arthroplasty – 2/6 successful
  • 9 had tibial lengthening

• Av age at surgery 4 years, av follow up 9 years
• Surgery difficult & results not successful in majority
Five years
Valgus OT at four years

Valgus OT at eight years
11.5 Years

Choi III B
GT Arthroplasty at one year, redislocated at 14 year follow up
Treatment of Severe Sequelae of Infantile Hip Sepsis With Trochanteric Arthroplasty

En B. Wang, PhD, Shi J. Ji, MD, Qun Zhao, MD, PhD, and Li J. Zhang, MD

JPO 2007

- 30 Hips, Choi IV hips
- GT Arthroplasty 11-98 months
- Seven year follow up

- Worse outcome if surgery after 4 years
- 10 subluxed at follow up
- 14 had some pain at follow up
Osteochondroplasty of the femoral head in hip reconstruction for type II late sequelae of septic arthritis: a preliminary report

Hazem Mossad El-Tayeby

- 16 Hips in 13 patients
- 2 – 12 Years
- Late sequelae of septic arthritis of hip
- Used pre op X-Ray, CT or MRI
- Very aggressive reconstruction with osteochondroplasty
- 13/16 had a satisfactory result
- Concern re single author
Bilateral osteochondroplasty & left Salter OT
4 Year old boy – OR, Femoral OT and Salter OT
Three children, mean age 4.3 years

Hunka functional results – 1/3 satisfactory (stable hip joint, flexion > 50°, FFD < 20°, pain free, good ADL)

Did not recommend procedure – more appropriate for UL
• 27 Hips – Choi IV B
• 21 Modified Albee / Harmon arthroplasty, 6 observed
• Ten year follow up
• Less severe LLD and better ROM if under two years at time of surgery
  • Better ROM, less LLD, better HHS
• 21 Hips, 6 year follow up
• 18 Required OR
  • 50% good clinical outcome
• 11 Hips, Hunka IVB and V
• Mean age at surgery 5 years
• Mean follow up 22.5 years
• Two stage greater trochanteroplasty
• Good outcome in 8/11 cases – 30% flexion / abduction, painless, walking independently
Loss of a condyle of the femur or tibia following septic arthritis in infancy: problems of management and testing of a hypothesis of pathogenesis

Stéphane Tercier · N. D. Siddesh · Hitesh Shah · K. M. Girish · Benjamin Joseph
Conclusion
Management of Sequelae of Septic Arthritis

• Many options available
• Range from conservative / prosthesis to multiple reconstructive procedures
• Beware of converting a painless mobile joint into a painful stiff joint
• Treat the patient & not the X-Rays
• Reconstruction options
  • Collona GT Arthroplasty under 4 years
  • Albee / Harmon femoral reconstruction under 4 years
  • Ilizarov reconstruction & lengthening over 6 years
Conclusion. Wits Approach Management of Sequelae of Septic Arthritis

- After washout
  - Check AP Pelvis XRay
  - Use Gallow’s abduction traction / Pavlik harness 3 weeks or hip spica for hip

- **Consider** femoral / pelvic OT for Choi I-III & contralateral epiphysiodesis

- Conservative for Choi IV and V with prosthesis +- contralateral epiphysiodesis

- Literature repeatedly shows more pain and stiffness after reconstruction cf conservative approach for severe hips
Thank You