Let’s be Precise! – the RCH Experience with the Precice Lengthening Nail

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Limb Reconstruction
Causes of Leg length discrepancy in children

• Congenital – born with a problem causing slow / poor growth
  • Longitudinal deficiency
  • Fibula/tibia hemimelia
  • Congenital short femur

• Acquired
  Trauma – physeal injury eg meningococcal disease, accident, infection

• Tumour – as treatment options improve more children avoid amputation and survival rates improve. Bone loss from surgery robs the limb of length.
What is Precice?

• Intramedullary lengthening nail which is driven by a programmed magnet held external to the skin

• Has a part that can change length & an extension rod

• Rod gets longer – limb gets longer

• Magnet and gear system that allows lengthening and shortening
How does it work?

• Patient goes to theatre has osteotomy of bone – left for 3-5 days (latency period)

• Commence lengthening as ordered (0.75 – 1mm/day)

• Hand piece is placed over the mark on the leg

• Ensure handpiece is pointing with arrows toward feet
How does it work?

• Press start

• Lengthening will continue until device stops itself

• Can stop unit at any time
  • Move unit off leg
  • Press any button on unit
Preparation for lengthening

• Choose area to undertake the lengthening

• Ensure all metal items are removed from pockets and area

• Check over the Unit for any issues

• Connect to power source and follow prompts

• Locate the implant – leg should have an area marked on it in an indelible marking pen
Why Precice? – Pros

- Avoids use of frame
- No pin sites – pin site infection
- No frame after lengthening is complete
- Visually appealing – esp for children & females
- No shoe raise required
- Target length largely achieved /high rate of achieving goals
- Accurate (esp compared to previous nail)
Why Precice? – Cons

- “Victims of our own success” – patient feels & looks so well they can be reluctant to take advice
- On crutches for long period (up to 3 months)
- Must be removed at some time
- Hiccups with programming of Controller
- Bulky carry case and unit
- Crosses physis – only available once growth ceased
- Size – smallest diameter is 8.7 mm so limits some paediatric cases
Nursing involvement

• Patient must follow the established pre-admission process: no PARC / No surgery

• Patient to be aware of commitment required to treatment success
  • Full engagement required
  • Interruptions to daily life to do the adjustments
  • Frequent follow up appointments
  • Impact on schooling
  • Full commitment to physiotherapy program
  • Ability / willingness to take on board the information and follow guidance
Pre-admission process

• Similar to that followed in preparation for THR / TKR but with paediatric & family centred focus
• All multi-disciplinary team members present
  • Physiotherapist – most important team member through entire journey
  • OT
  • School Teacher
  • And of course…… Nursing coordinator!

• Determine operation date and stick to it
• Inpatient stay of 2 - 3 days
Pre-admission process

• Pain management:
  • Long discussion in preadmission
  • Ongoing issue for many patients after
  • Need for high dose/ regular analgesics
    • Improvement needed for GP involvement

• Point of contact vital for families
The journey

- 22 cases – June 2013 – September 2015
- Median age – 14 years
- 14 males : 8 females
- 15 left : 7 right
- 20 femoral
- 2 tibial
The journey


- Congenital / idiopathic – 12
- Physeal trauma – 4
- Meningococcal septicaemia / similar – 2
- Multiple hereditary exostoses – 1
- McCune Albright – 1
- Tumour - 2
The journey

• 22 Cases – June 2013 – Sept 2015

• Median target length 50 mm (range 25 – 60 mm)
• 19 pure lengthening  3 acute angular correction and lengthening
  • 2 femurs
  • 1 tibial

Surgeons: Chris Harris, Leo Donnan, Ian Torode
The journey


- Median target length 50 mm (range 25 – 60 mm)
- Percentage of original bone lengthened
  - 12.1 (5.8 – 20.3)

- Rate per day
  - 0.94 mm (0.75 – 1.5)

• Obstacles – 10 patients
  • 2 premature consolidation of femur rectified by repeat osteotomy
  • 1 premature consolidation of fibula requiring repeat osteotomy / syndesmosis screw
  • 1 proximal fixation revision (day 7)
  • 3 broken nails –
    • 1 rectified by revision to trauma nail
    • 2 replace nail and recommenced lengthening
  • 1 patella dislocation rectified by ITB release and temporary cessation of lengthening
  • 1 calf contracture – rectified by TA lengthening
  • 1 deficient regenerate requiring autogenous bone grafting
Cases studies

• 18 year old male
• Congenital longitudinal deficiency
• LOS: 3 nights

• Premature consolidation
Back to theatre

• Re-osteotomised

• 1 night LOS
Case studies

- 18 year old male

- Went on to complete 5cm lengthening
Case studies:

• 11 year old female – tibial lengthening
• Meninogoccal septicaemia – LLD
Case studies

- 11 year old female
- Premature consolidation
  - Technical error
  - Patient factors
  - Back to theatre – re-osteotomised
Case studies:

- 11 year old female

- 45 mm lengthening
Case studies

• 13 year old female
• Meningoccal septicaemia
• 5 cm lengthening
Case studies: Ooops!

- Non compliant with PWB status
- Rod is not indestructible!
Case studies:

- 13 year old female
  - Changed over to a trauma rod with no loss of length
  - 5 cm obtained
  - Frame avoided!
22 cases – (June 2013 – Sept 2015)

• Complications
  • 19 patients : reached target length as per goals set at beginning
  • 3 patients : 5 cm lengthening (target 6cm)
    • 1 – we decided to stop in error
    • 1 – we decided to stop because of mental state
    • 1- we decided to stop because of knee stiffness
Summary:

- Niggly problems but not unexpected nor unacceptable
  - Eg: trolley now has wheels
  - Further training to iron out the problems with the computer
  - More sizes now available – increased flexibility

- Fairly typical obstacles in 45% of pts
  - Tightness
  - Frustration
  - Compliance
  - Premature consolidation

- Low rate of complications / high rate of achieving goals
Handy resources

- Youtube – Dr Rozbruch – USA
- The Precice nail – 10 minute interview and demonstration
- Precice nail – WPBF Interview
- Paley Advanced Limb Lengthening Institute Florida
- Ellipse – Patient information FAQ’s / Cheat sheet
- RCH – development of information
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