Custom knee device (CKD) for the treatment of knee flexion contractures (KFC) after ISKD femoral lengthening.

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Introduction:

- Limb lengthening with an ISKD can result in Knee Flexion Contracture (KFC).
- The (CKD) is a custom molded, hinged brace that delivers a slow sustained stretch over time.
- Use of the CKD with physical therapy is an alternative to surgery for Rx of KFC.

Material:

- Retrospective review of 27 KFC after ISKDFemoral lengthening from 2002 to 2007
- 23 subjects (27 femurs)
- Mean age 24.7 years (range 11 - 58 years)
- Mean lengthening 5.4 cm (range 3.3 - 7.5 cms)
- Mean KFC 36º (range 10º - 90º)

- CKD constructed on average 4.2 weeks after index surgery (range 1.0 - 7.0 weeks)

- 14 Posterior tibial subluxation
- 8 subjects had nerve symptoms
- 5 subjects had nerve signs and required peroneal nerve release.

Case Study 1

- 16 year old female
- Congenital short femur
- 5.5 cm lengthening
- KFC of 40 º with subluxation and nerve symptoms
- CKD applied 4.5 weeks from date of surgery

CKD applied with AP straps to Rx Subluxation

Final Result

3 weeks from CKD application

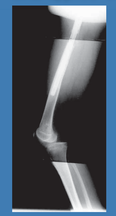
Final Result

Case Study 2

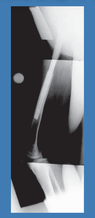
- 15 year old female
- Congenital Short Femur
- 5 cm lengthening
- KFC of 35 º
- CKD applied 3 weeks from date of surgery

Pre -op

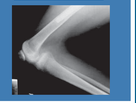
CKD applied



3 wks CKD +PT



Final Result



- CKD was designed using Polyester-based casting tape (Dynacast PII BSN Medical, Charlotte, NC).
- A stockinette is applied. The knee joint axis is marked, and one layer of casting tape applied. Polycentric knee hinges (EBI, USA) bent around the knee joint
- Once the hinges are incorporated into the cast, two proximal and two distal hooks are applied. These hooks are then used as fulcrums to anchor an elastic band for the application of tension.
- After the cast is sufficiently dry, it was cut longitudinally and removed. The edges are trimmed and lined with adhesive fleece liner for patient comfort.
- Patients shown how to apply and remove the brace and are advised to keep it on for 6 to 8 hours per day.

CKD + Physical Therapy Regimen

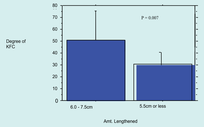
- PA Joint Mobilization and stretching of hamstrings, TFL and IT band.

- Neuromuscular electric stimulation to quadriceps mechanism
- CKD worn 6-8 hrs/day with daily stretching at home.

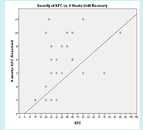
Results:

Full extension within 5	= 25/27 (93%)
10-15 degrees residual KFC	= 2/27 (7%)
Mean recovery time	= 7.9 weeks (5-11)

Amount Lengthened vs. Severity of KFC



Magnitute of KFC vs. weeks to recover



Conclusion:

- Successful resolution of Knee flexion contracture in majority of cases 25/27, (93%).
- 2 KFC's that failed CKD + PT improved after soft tissue release followed by CKD+PT.
- CKD is customized, simple/safe to use and reliable modality to treat KFC.
- Inexpensive - ($125 to $150)

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