Introduction:
The method of reconstruction utilized for type II and IIIA thumb hypoplasia varies between individual surgeons. The two most commonly utilized techniques are adductor digit minimi (ADM) and FDS ring finger opponensplasty. There is a paucity of outcomes studies utilizing the FDS ring opponensplasty technique in children with reconstructible hypoplastic thumbs. This is our preferred reconstructive method as it:
• Augments thumb opposition.
• Tendon length allows for concomitant collateral ligament reconstruction without additional graft required.
• Avoids donor site morbidity on the ulnar side of the hand.

Objectives:
• To confirm that FDS opponensplasty:
  - Effectively restores and maintains opposition function
  - Is a robust reconstruction that can be applied to both type II and IIIA thumbs.
• To determine if:
  - Transverse carpal ligament (TCL) and Flexor carpi ulnaris (FCU) pulley locations provide equivalent outcomes in strength and function.
  - Pinch and grip strength are equivalent to previously published outcomes for ADM opponensplasty.
• We report our outcomes utilizing the FDS ring opponensplasty and establish reference pinch and grip strengths for this procedure

Methods:
Retrospective review of patients who had undergone an FDS ring opponensplasty with or without collateral reconstruction
Minimum of 2 years post-operative follow up to ensure complete rehabilitation had occurred.
The study group consisted of 36 patients and 40 hands.
• All patients underwent:
  - Follow-up clinical examination
  - Therapist assessment including standardized grip and pinch testing
  - Outcome measures including Kapandji scores, criterion referenced tasks, and PODCI scores.
• Study patients were compared to age and sex matched normative data and previously published ADM outcomes.

Patient Demographics:
• 36 patients with 40 type II and IIIA thumbs were reviewed.
• Mean age at surgery was 4.9 years (range 2-12.2).
• Average follow up of 7.6 years (range 2-16.3).
• 9 Type II thumbs and 31 Type IIIA.
• 17 thumbs were isolated congenital abnormalities and 23 were associated with documented syndromes.

Surgery:
• All patients underwent a ring FDS opponensplasty with a 4 flap Z-plasty for first web space deepening.
• The pulley for opposition was FCU in 19 hands and the TCL in 21.
• 36 thumbs had ulnar collateral ligament reconstructions
• 5 of the 36 had combined UCL/RCL stabilizations.
• 5 patients went on to have secondary surgical procedures
  - 3 RCL reconstructions for ongoing MCP joint instability

Results:
• Opposition testing:
  - Kapandji score averaged 8 (range 4-10).
  - Grip and pinch were standardized to published means by age and gender.
  - Grip 46%.
  - Lateral pinch 49%.
  - Tripod pinch 48%.
• There was a significant difference between Type II and Type IIIA thumbs
  - Grip strength: II=60%, IIIA=42% (p=0.039).
  - Lateral pinch: II=61%, IIIA=46% (p=0.019).
• There was no significant difference between surgical pulleys used.
  - Kapandji score – FCU B4, TCL 7.6 (p=0.13).
  - Grip strength – FCU 42%, TCL 50% (p=0.27).
  - Lateral pinch – FCU 49%, TCL 49% (p=0.94).
• Criterion referenced tasks:
  - All children were able to grasp a small pellet, one inch cube and standard dowel.
• PODCI Scores:
  - Global - 90.76 (53-100).
  - Happiness - 87.45 (15-100).

Summary Points:
• FDS IV opponensplasty is an effective method for providing opposition for both type II and IIIA thumb hypoplasia.
• No statistically significant difference was found between outcomes using the TCL or FCU pulley.
• Type II thumbs had significantly greater grip and pinch strengths when compared to the Type III group.
• FDS opponensplasty does not restore normal strength however it is at least as effective as previously published techniques.

References:

Carley Vuillermin, MBBS FRACS; Scott Oishi, MD; Amy Lake, CHT; Janith Mills PA-C; Lesley Wheeler, BA; Marybeth Ezaki, MD.