

Recently I had a young patient with hand trauma which resulted in multiple finger fractures and tendon injuries. After rehab all the fingers did remarkably well except the index which was fused.



For a 23 years old autistic artist, this may prove to be challenging in the long run to have to adapt to use of hand without an index finger, which may get in the way of making his sculptures.

While doing a lit review on index finger arthroplasty, I came across articles that discouraged single index implant arthroplasty. The complications were numerous from implant loosening with migration along with high subsidence rates.

Hand (N.Y.). 2019 Aug 6;1558944719864453. doi: 10.1177/1558944719864453. [Epub ahead of print]

Factors Associated With Reoperation After Silicone Proximal Interphalangeal Joint Arthroplasty.

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Hand (N.Y.). 2018 Aug 2;1558944718791186. doi: 10.1177/1558944718791186. [Epub ahead of print]

Prosthetic Arthroplasty of Proximal Interphalangeal Joints for Treatment of Osteoarthritis and Posttraumatic Arthritis: Systematic Review and Meta-Analysis Comparing the Three Ulnar Digits With the Index Finger.

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I started to wonder what therapists can do to assist with improved outcomes with these injuries and more so why does it happen in Index finger more than others.

Surgeon find their ways of improving outcomes like cementing and so on, but for a life to be lived, therapists must come up with ways to improve those outcomes and for those surgeries to last.

I looked at the possible causes for subsidence and implant loosening in the absence of trauma for these patients.

1) Hand Function

Activities of daily living that would stress the index proximal interphalangeal joint. From angulation at the PIP joint due to stress from pinching activity like using a key or opening a jar to *levering* on the middle phalanx to hold a coffee cup may place undue pressure on the joint resulting in its loosening or subsidence



2) Hand Mechanics

So, we looked closely at these hand mechanics and what could be done about it.

The key pinch ideally should be at P1 but if held at the tip puts pressure on the index finger at the end on the side ulnarly angulating it right at the index PIP joint. The pressures from opening jars doesn't just angulate at the MP joint but also at the PIP joint. Hanging a cup of coffee at the P2 levers the finger and angulates it ulnarly at the PIP of the index finger. The other fingers get shielded primarily because the index takes most of the pressure. It is when index cannot withstand the force, then the other fingers come into play.

Now let's add CMC arthritis to the mix. 1st CMC joint if arthritis results in radial subluxation of the metacarpal causing adduction of the thumb. If patients have 1st CMC OA, it limits the pronation of the thumb to perform a pulp to pulp pinch, instead the pinch pattern changes to the lateral side of P2 putting more stress on the PIP joint in an ulnar direction. Ability to abduct the thumb to hold a jar is limited which adds to the pressure at the PIP joint of the index and thumb UCL at the MP joint.



Therapists can assess for this prior to surgery, provide a CMC splint if needed, release the adductor of the thumb and provide force couple strengthening exercise for the thumb abductor/ opponence muscle and 1st dorsal interossea to keep

the CMC from progressive arthritis. The therapist must also educate the patient on future pinching and gripping mechanics and provide adaptive devices for these patients to increase the life of the index implant.

3) Adaptive devices



4) Co-Morbidities

If the patient presents with other systemic conditions like Rheumatoid arthritis or other conditions like Ehlers Danlos Syndrome or even hypermobility in the joints, then, these patients may be at a disadvantage to getting these surgeries. A thorough prior assessment is pertinent for these patients. These patients due to lack of ligament support also lack proprioception resulting in excessive pressure to hold on to objects which may result in loosening the implant. What can be done about these patients?



5) Splinting



Patients with CMC OA or hypermobility may have to wear splints for an extended period or may be for good. This may not only prevent the joints from loosening but prevent future problems with arthritis. Choices are plenty these days with custom thermoplastic splints to silver ring splints to 3D splint constructed just for them.

Yes, these may be the precautions that we would have to adhere to, to prevent subsidence and loosening of the implant if we want to achieve long term pain free function and not have to repeat surgeries. After all, with hip surgeries we do place precaution to prevent crossing the leg or bending beyond 90 deg and they have been successful with it. So, why can't we set a few rules for these surgeries to achieve success.

With my younger patient the demands may be high, but it may still be an option if the mechanics are corrected early on to develop the correct pulp to pulp pinch pattern, use adaptive devices and splints to enhance and maintain his hand function.

With a perspective,
Sincerely,

Saba Kamal, OTR, CHT
Director Hands-On-Care