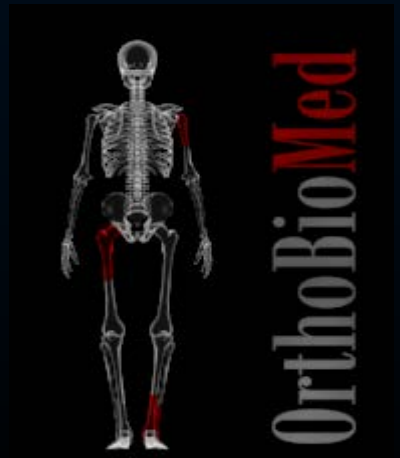
ENDOSCOPIC CARPAL TUNNEL RELEASE



Lifelong Learning

Conservative Treatment

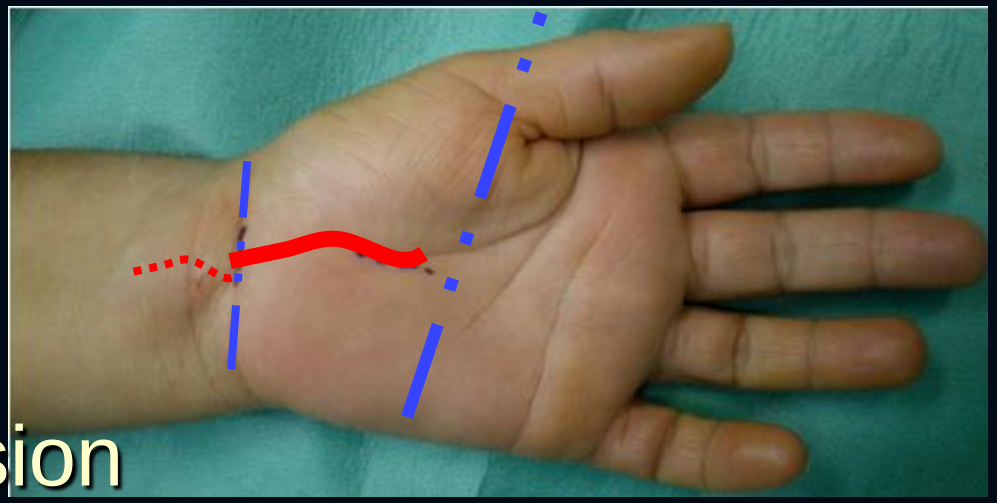
- Underlying condition is self-limited: pregnancy.
- Mild symptoms.
- Occupational factor that could be modified.
- Wrist splint: Slight wrist extension. During sleep.
- Steroid injections: Intraneural injection must be avoided.

Conventional Carpal Tunnel Release

- Indications: Continued or disabling symptoms with abnormal electrical studies, evidence of muscle weakness or atrophy, and increased two point discrimination.
- Local anesthesia: 50%-50% combination of lidocaine and marcaine without epinephrine.
- Incision: ulnar to the palmaris longus at the distal wrist crease extended distally in a line trajectory between 3rd and 4th fingers until the base of the thumb (length: 4 cm).
- Avoid injury of any banches of the palmar cutaneous nerve.
- Sectioning of the palmar aponeurosis.
- Identification and sectioning of the transverse carpal ligament.
- Identify anomalous position of the motor branch.
- Avoid injury of the vascular arch while sectioning the distal segment of the transverse carpal ligament.
- Motor branch decompression if significant motor weakness and atrophy are present.
- Neurolysis if it is a reintervention and fibrosis is the presumable cause of failure.

Carpal Tunnel Release: Phalen GS 1950

- first surgical procedure for CTS
- open approach through extended longitudinal incision



  - *from Kaplan's cardinal line*
  - *to the wrist crease or beyond*

Disadvantages *of Phalen's technique*

- hypertrophic & sensitive scar
- pillar pain

many clinicians attempt

⇒*smaller incisions*

MacDonald RI et al, J Hand Surg 1978
Benson LS et al, Arthroscopy 2006

Endoscopic Carpal Tunnel Release

- Similar indications but more limited.
- NO indicated in: rheumatoid arthritis, significant tenosynovitis, recurrent CTS, concurrent ulnar tunnel syndrome, or space occupying lesion.
- Pain seems to be less.
- Strength improves earlier but overall, no significant benefit over the open release.
- Most common complication: incomplete release.
- Other complications: median nerve injuries, superficial vascular arch injuries, and tendon injuries.

endoscopic *Carpal Tunnel Release*

using *2 small incisions* (2 portals)

Chow JC Arthroscopy 1989

using *Single*-portal without palmar incision

Agee JM et al, J Hand Surg Am, 1992

=>**less** post-op morbidity

=> **faster** return to activities

Endoscopic *vs* **O**pen

faster recovery of

- grip & pinch strength
- wrist range of motion
- less mid- & distal-palm tenderness

Chow JC Arthroscopy 1990
Palmer DH et al Arthroscopy 1993

Burden from of endoscopic technique

- more surgical time
- expensive equipment & disposables
- special training
- neuro-apraxia

Murphy RX et al J Hand Surg Am 1994

Brown RA et al JBJS Am 1993

A systematic review of reviews comparing effectiveness of Endoscopic & Open carpal tunnel decompression.

The endoscopic carpal tunnel release technique is worse in terms of reversible nerve injury but superior in terms of grip strength & scar tenderness at least in short-term follow-up.

Thoma A et al. Plast Reconstr Surg. 2005

Endoscopic vs Open surgery for CTS Outcomes among employed Patients

Randomized Control Trial

Atroshi I ET AL, BMJ. Jun 2006

endoscopic => less post-op pain than open,

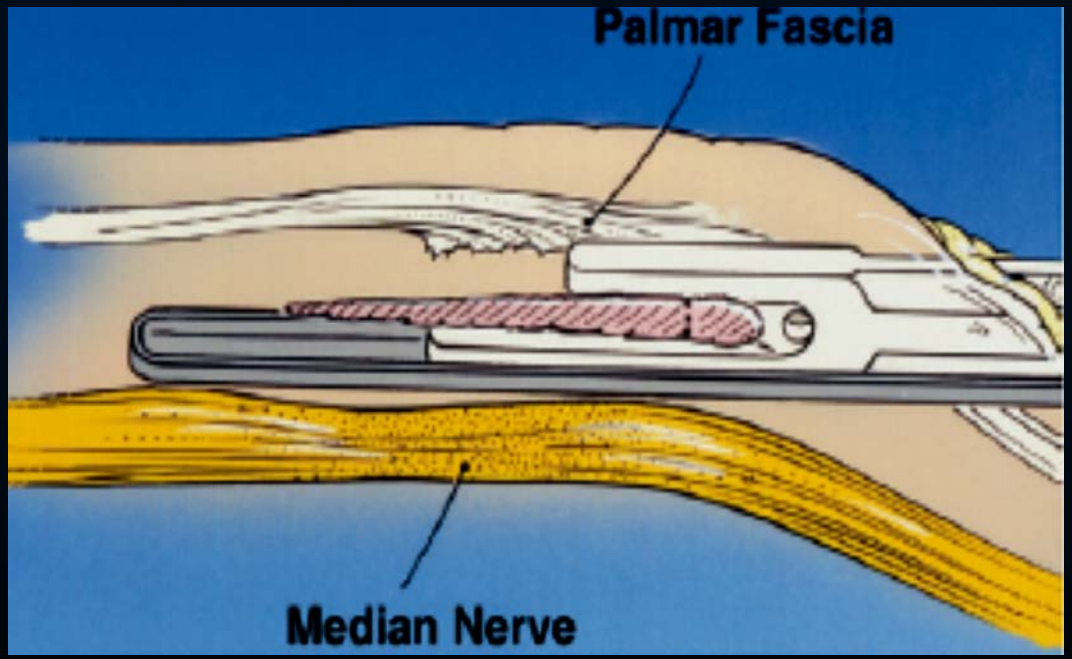
but the small size of the benefit

& similarity in other outcomes

make its cost effectiveness uncertain.

"*Indiana Tome*" technique

- comparable results of efficacy to open & endoscopic techniques



Lee WPA et al Plast Reconstr Surg 1998
Agee JM et al J Hand Surg Am 1992

"IndianaTome" *Carpal Tunnel Release*

- small palmar incision along with cutting "tome"

Combines:

- safety of open direct visualization
- less tissue trauma of endoscopic technique

Results:

comparable to open & endoscopic techniques

Lee WPA et al Plast Reconstr Surg 1998
Lee WPA et al, Plast Reconstr Surg, 1997
Agee JM et al J Hand Surg Am 1992

Indiana Tome technique

- n= 694 pts CTS : 2 complications

Lee WPA et al, Plast Reconstr Surg 1998

- n= 1332 pts CTS
- f-up:13 yrs, 11 complications (0.83%)

numbness, transient neuroapraxia, incomplete release

Lee WPA et al J Hand Surg Am 2008

Open vs *Indiana Tome* technique

n= 100 *open* & 100 «*Indiana Tome*»,

CTS release

- 2 complications, f-up 7 yrs

- no significant differences in functional scores
- more persisting symptoms & recurrences

in Indiana Tome group

Cresswell TR et al J Hand Surg 2008

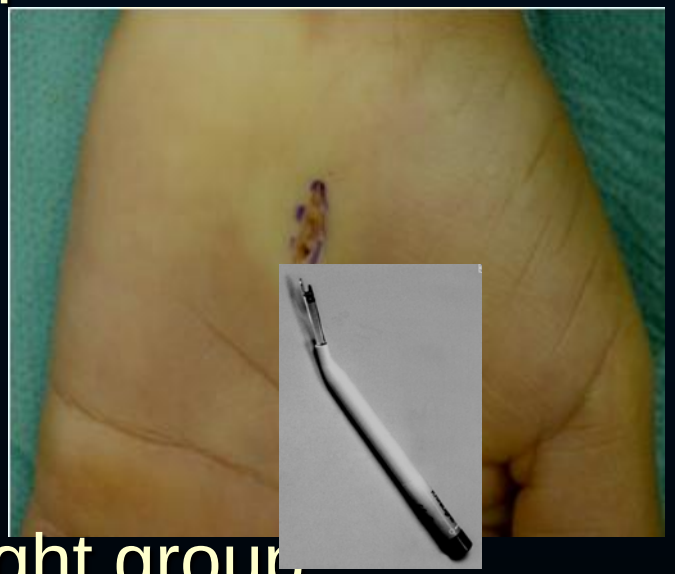
Open vs Knifelight technique

43pts open & 39pts

- no difference in grip strength, operative time
- significant improvement in time

  return to work

  & scar tenderness in knifelight group

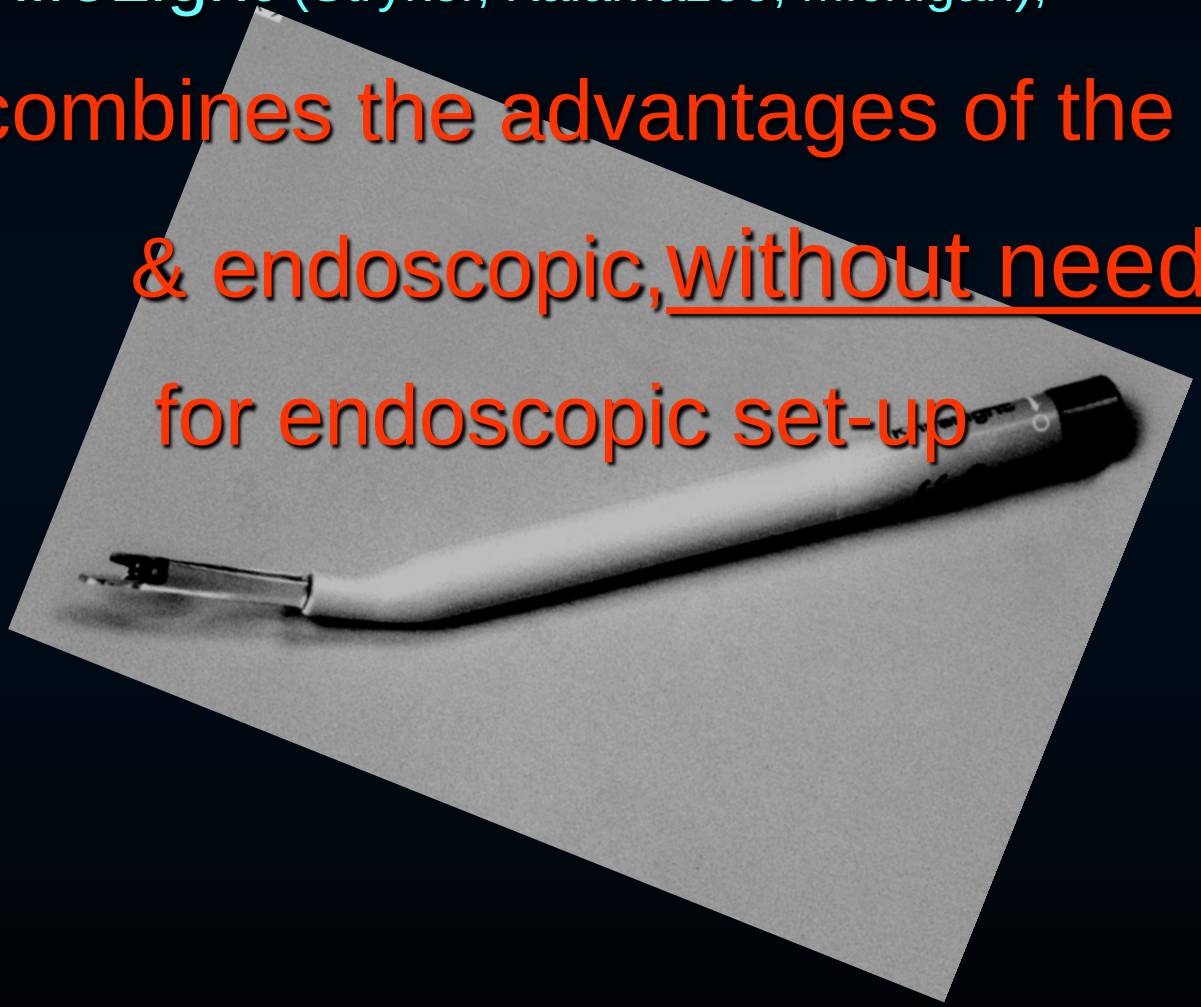


Helm & Vaziri et al J Hand Surg 2003

Minimally invasive CTS using KnifeLight.

KnifeLight (Stryker, Kalamazoo, Michigan),

- combines the advantages of the open & endoscopic, without need for endoscopic set-up



Hwang PY, Ho CL, Neurosurgery. 2007

Minimally invasive CTS using KnifeLight.

operation time & *time for return to work*:

the shortest compared with the conventional & endoscopic techniques.

quick, easy, & effective

alternative to conventional or endoscopic CTS

Hwang PY, Ho CL, Neurosurgery. 2007

Open "*2 small incision*" technique

local anesthesia
into volar wrist

Ortho-UTh

Start with: proximal

transverse incision

1-1.5cm

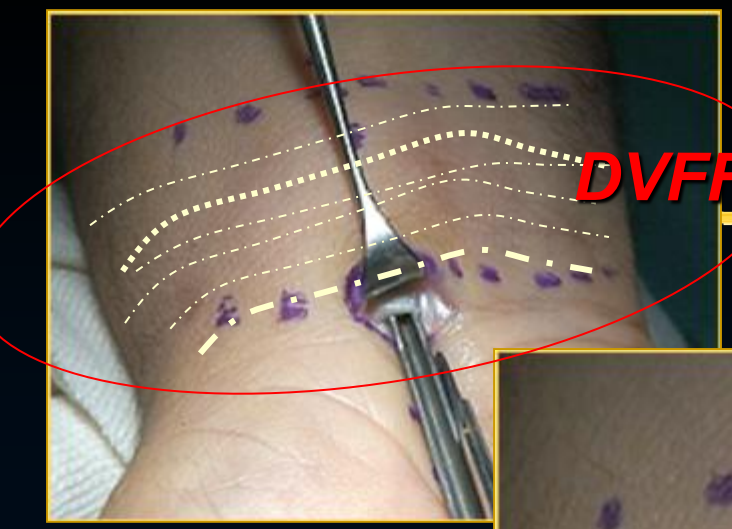
Distal volar

wrist crease

Incise *distal forearm fascia*

4 cm from distal to proximal

with no. *15 blade*



Pressure under DVFF with TCL intact

⇒ 61.2 +/- 43.6 mm Hg.

Following *TCL release*,

⇒avg *peak pressure beneath TCL*

significantly decreased to 14.0 mm Hg +/- 9.0

- avg peak *pressure under the intact DVFF*

Increased to 64.8 +/- 48.7 mm Hg

Means KR Jr, et all, J Hand Surg [Am]. 2007

TCL release alone is associated with persistent >30 mm Hg pressures Under the Distal Volar Forearm Fascia (DVFF)

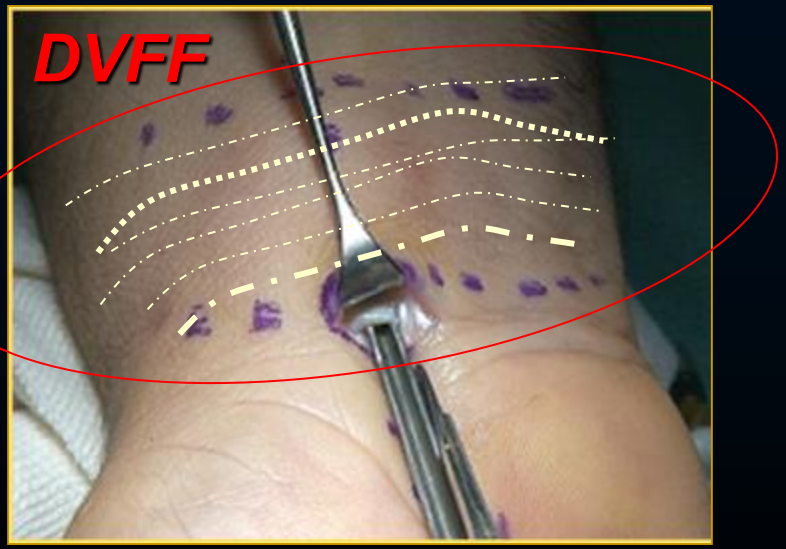
In a cadaver CTS model,

- TCL release *did not* significantly change the pressure drop-off under the DVFF.

Means KR Jr, et all, J Hand Surg [Am]. 2007

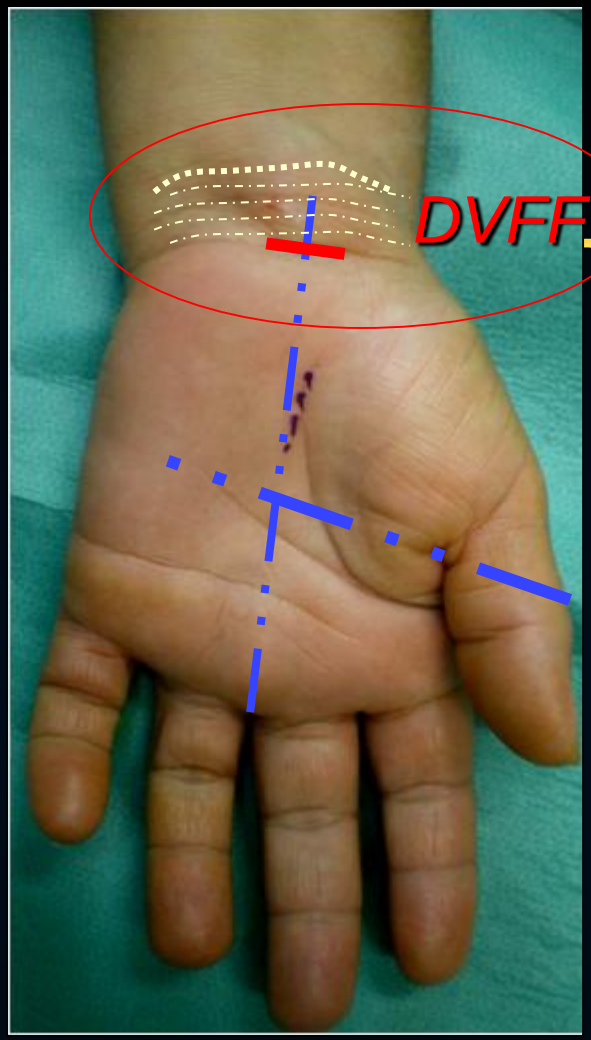
Pressure under DVFF with TCL intact

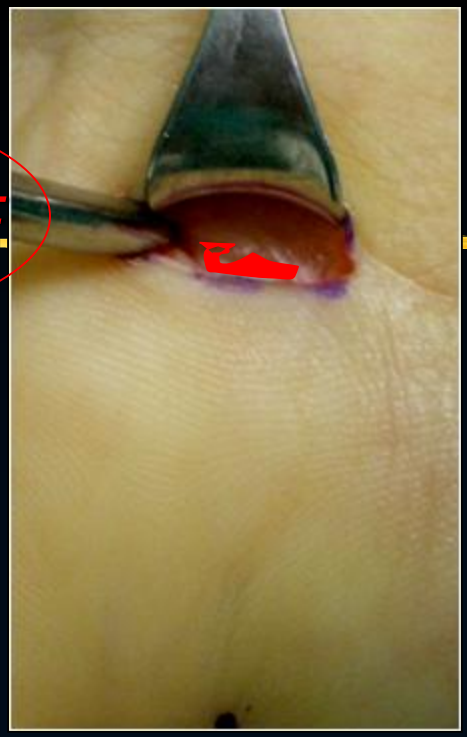
- Avg locations where DVFF pressure became < 10 mm Hg with intact & with released TCL were 4.30 cm +/- 1.8 & 4.00 cm +/- 1.8 proximal to the distal volar wrist crease

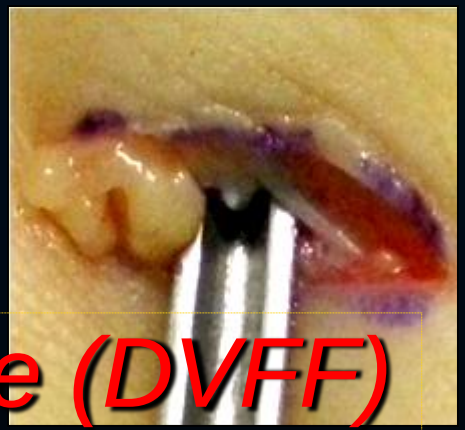


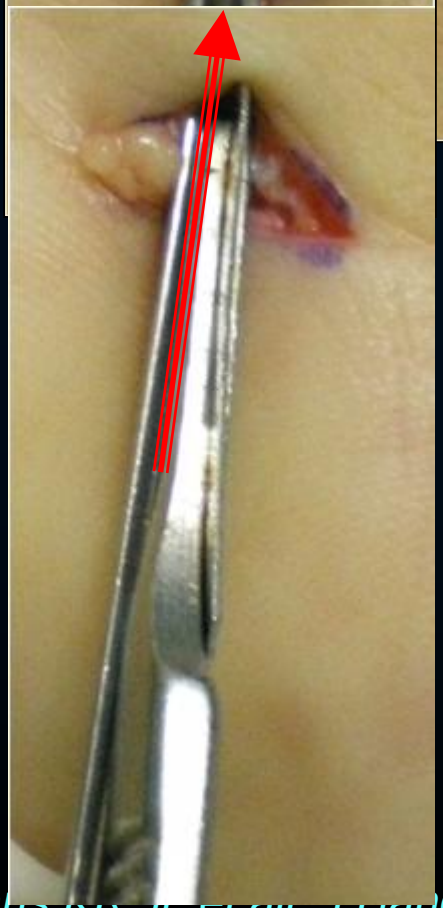
Means KR Jr, et all, J Hand Surg [Am]. 2007

Case 2





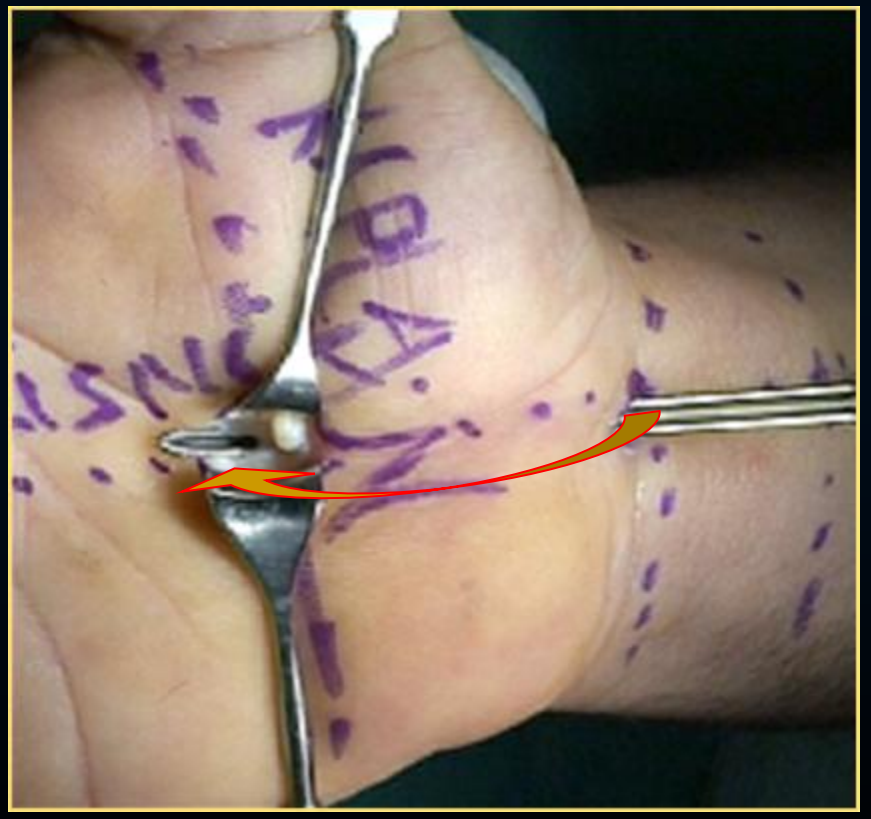




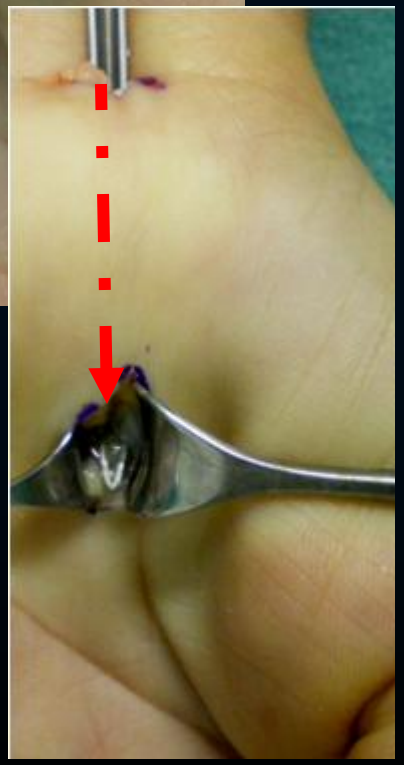
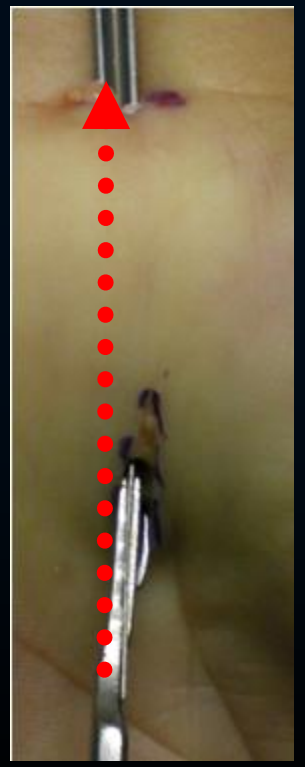
release of the (DVFF) is necessary in CTS decompression

Means KR Jr, et al, J Hand Surg [Am]. 2007

Distal incision 10-12 mm following the longitudinal palmar crease





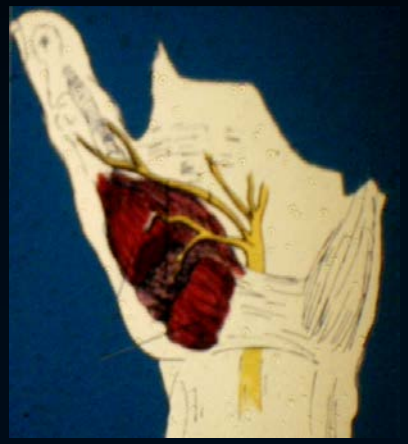
Results of 2-siCTS

Not indicated

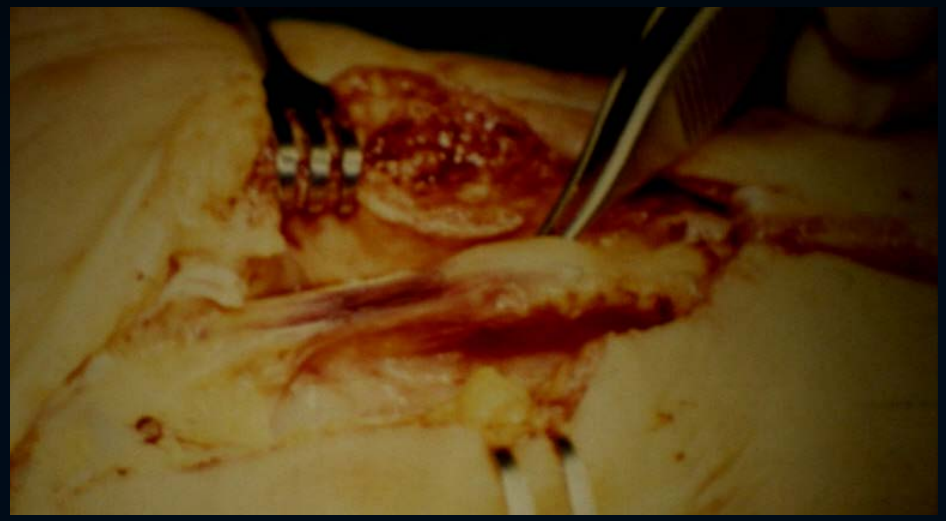
In neglected severe thenar atrophy

To avoid waisting the palmar aponeurosis

Usefull for a Camitz transfer









Results of 2-siCTS

1995-2007 (13 yrs) n =760 pts

5 converted to Open, *1 digit artery injury*

1 partial laceration 2nd common dig. Nerve

Examined for : palmar scar pain, residual numbness, patient satisfaction, time for return to work

=> Excellent results at minimum cost

Choice of Method of Treatment

A course of nonsurgical treatment is an option in patients diagnosed with CTS. Early surgery is an option when there is clinical evidence of median nerve denervation or the patient elects to proceed directly to surgical treatment.

Choice of Method of Treatment

Local steroid injection or splinting is suggested when treating patients with CTS, before considering surgery.

Oral steroid or ultrasound are options when treating patients with CTS

Choice of Method of Treatment

Complete division of the flexor retinaculum is recommended regardless of the specific surgical technique.