

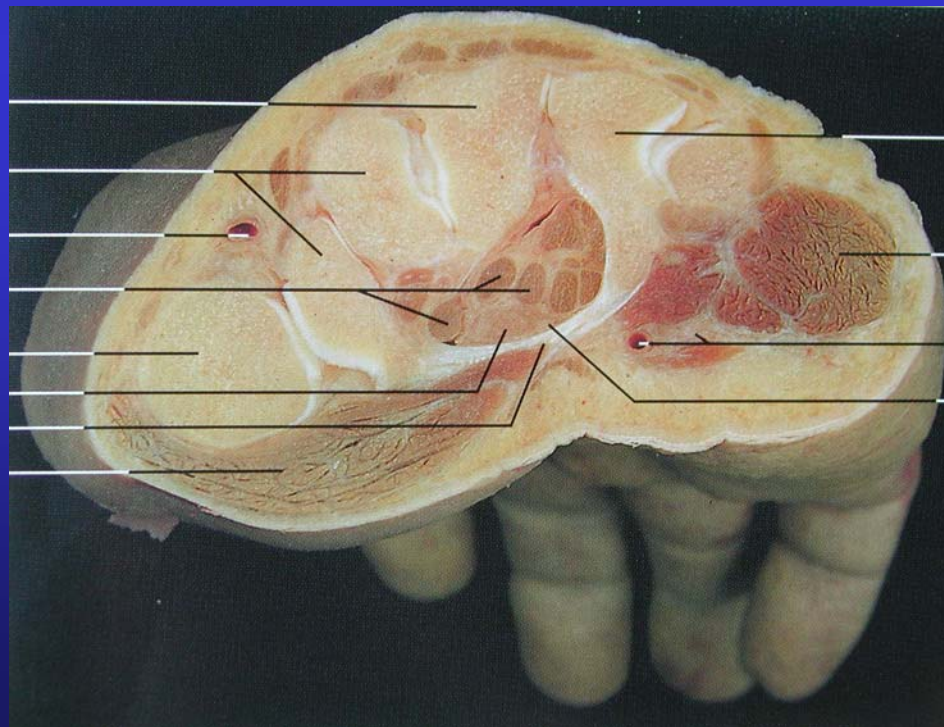
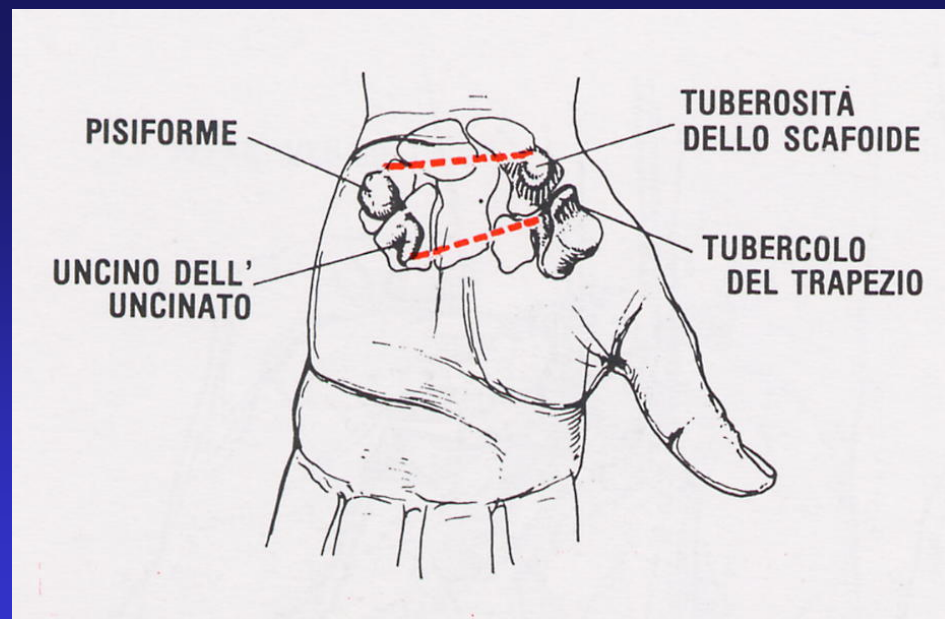
SINDROME TUNNEL CARPALE

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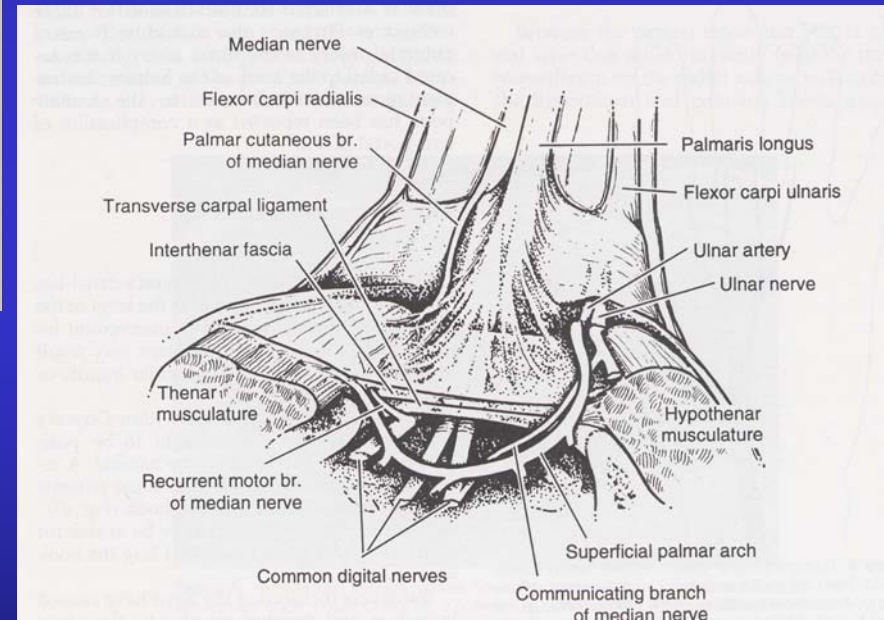
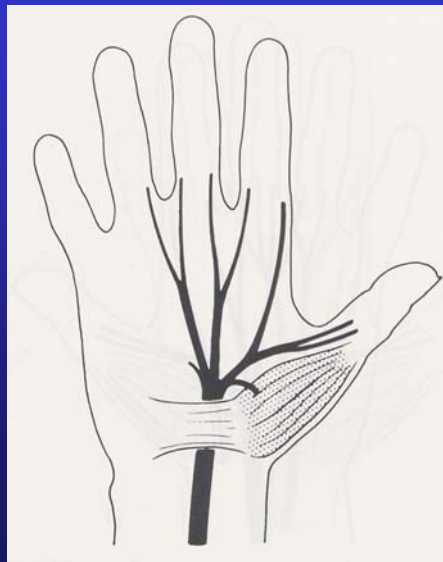
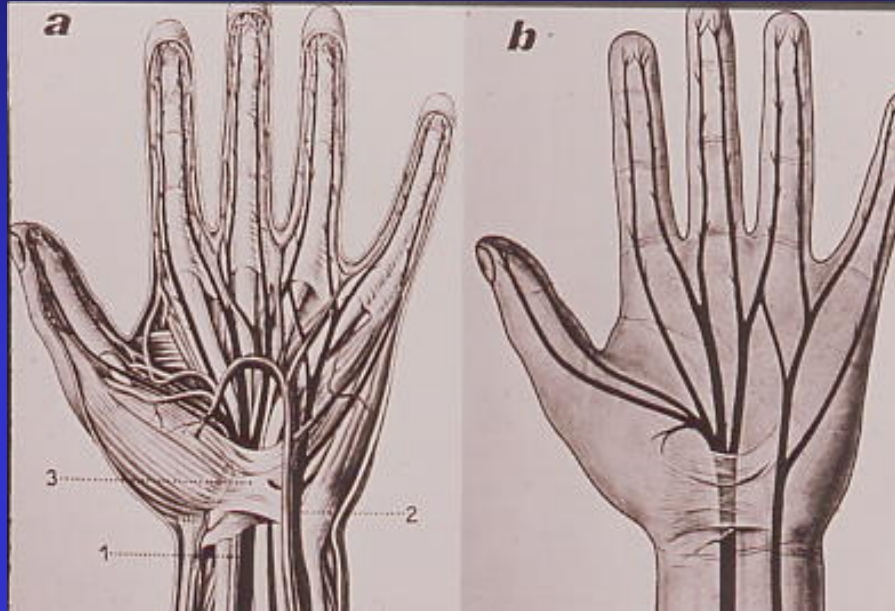
- 1865 Paget describe una compressione del n.mediano successiva ad una frattura di polso
- 1915 Marie e Foix individuano la compressione nervosa alla base della sindrome
- 1915 Tinel describe il test omonimo
- 1938 Moersch FP indica la sezione del ligamento come terapia
- 1946 Cannon e Love riportano per primi i risultati su 9 pazienti
- 1966 Phalen describe il test omonimo

- 1987 Okutsu descrive per primo una tecnica endoscopica
- 1989 Chow descrive la sua tecnica endoscopica
- 1992 Agee pubblica i dati su una ricca casistica con la sua tecnica endoscopica
- 1997 Iniziano i primi ripensamenti sulle diverse tecniche endoscopiche
- 2002 E la storia va avanti

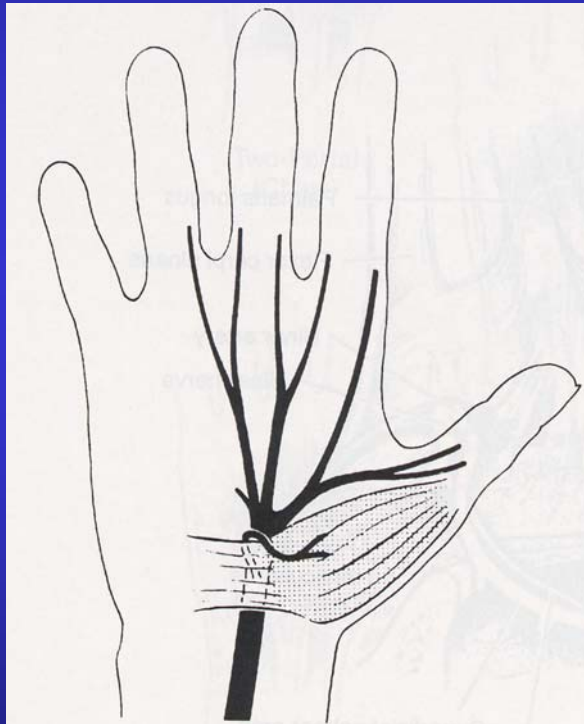
Prototipo della struttura
canalicolare,
inestensibile, con un
contenente ed un
contenuto



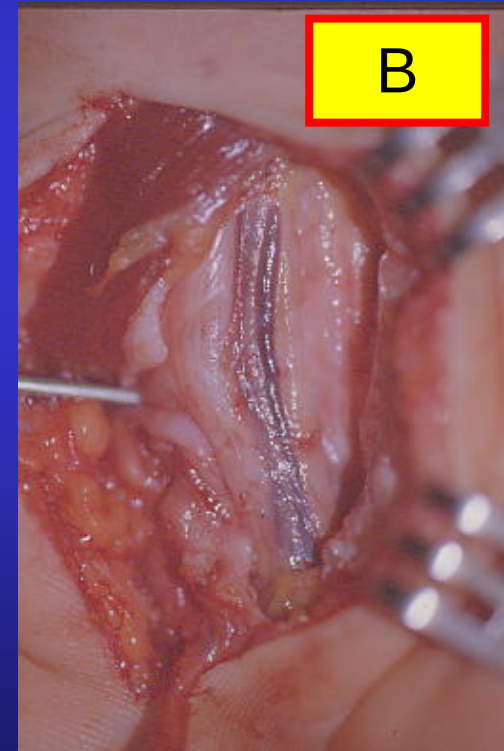
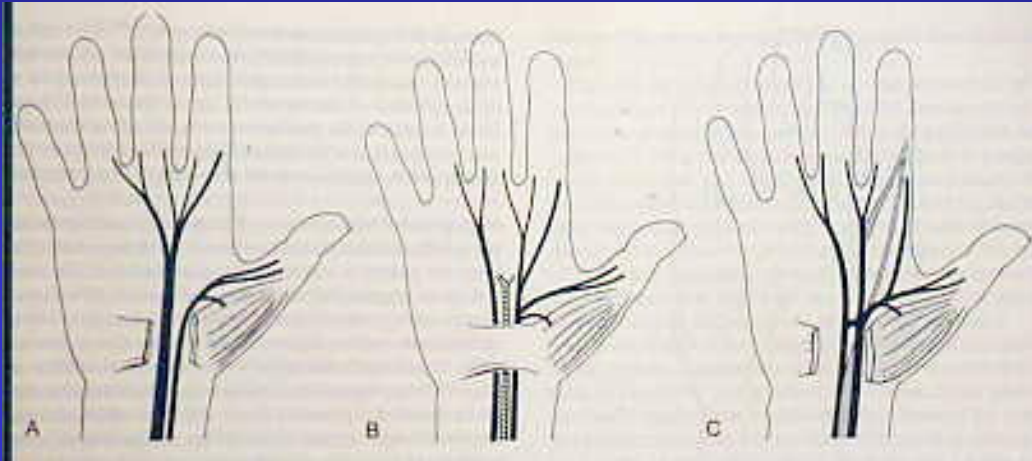
Anatomia normale



Anatomia normale del ramo motore (Ramo motore)



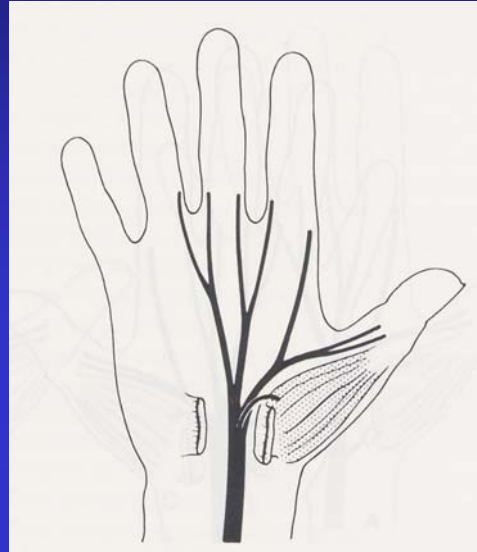
Varianti anatomiche del nervo (Duplicazione del nervo)



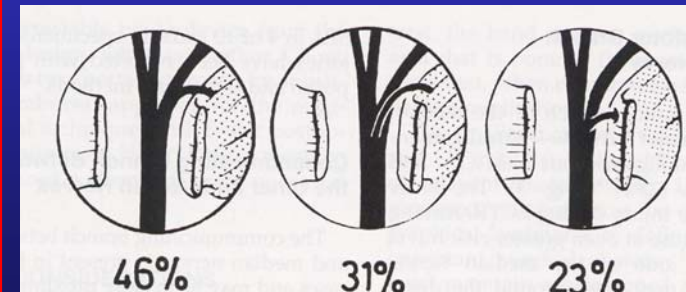
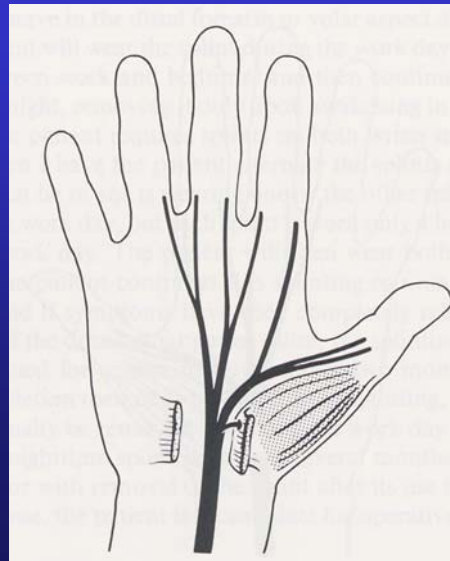
Variazioni anatomiche del nervo (ramo motore.1)

Lanz U
J Hand Surg
2, 44, 1977

**Emergenza
sottoligamentosa del
ramo motore**

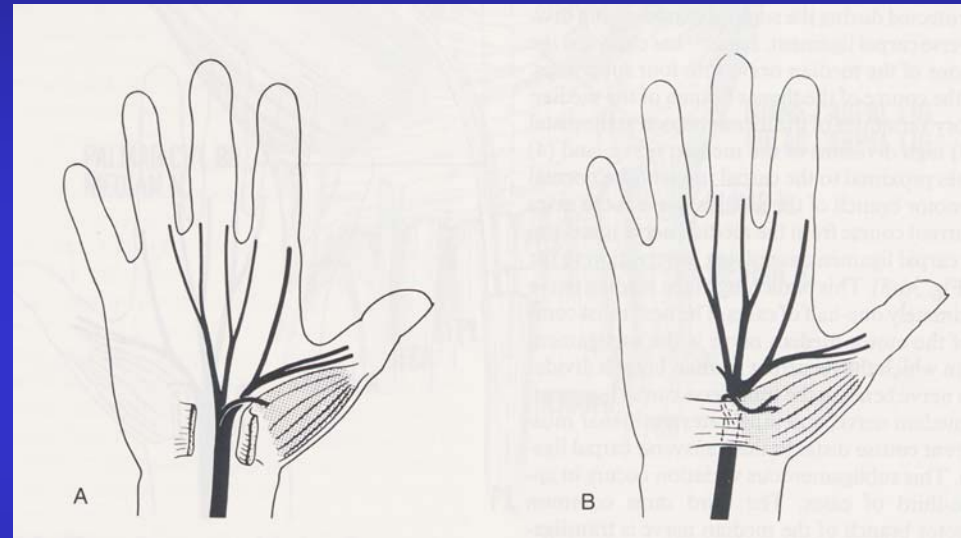


**Perforazione del
ligamento da parte
del ramo motore**

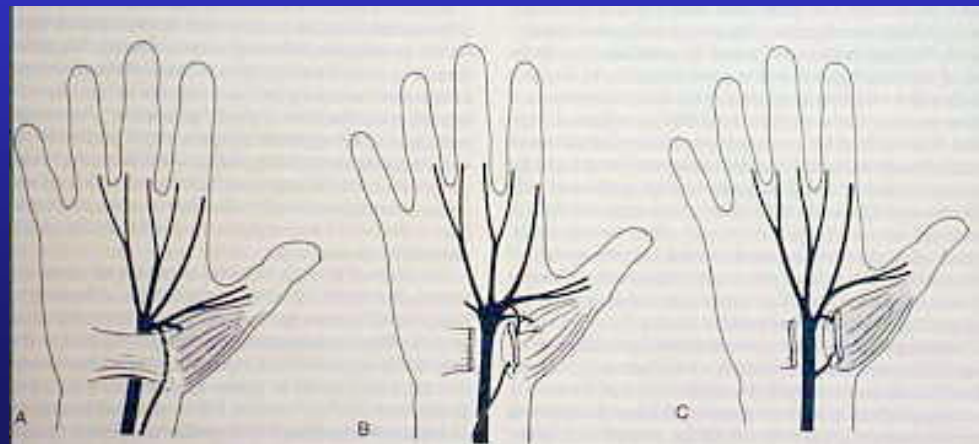


Varianti anatomiche del nervo (Ramo motore.2)

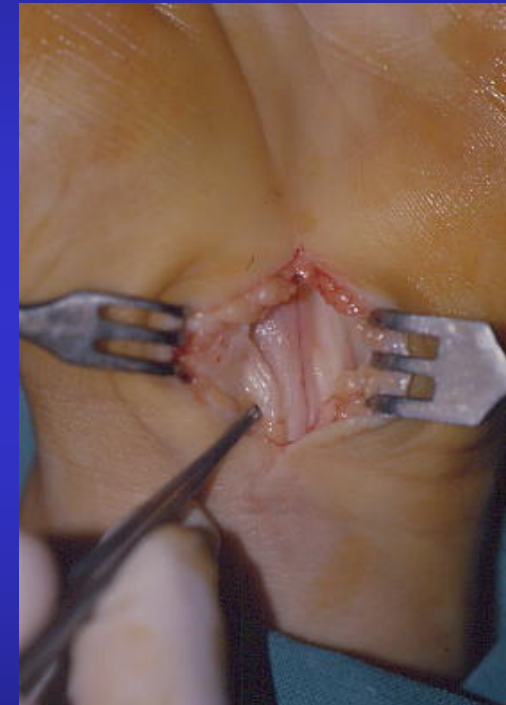
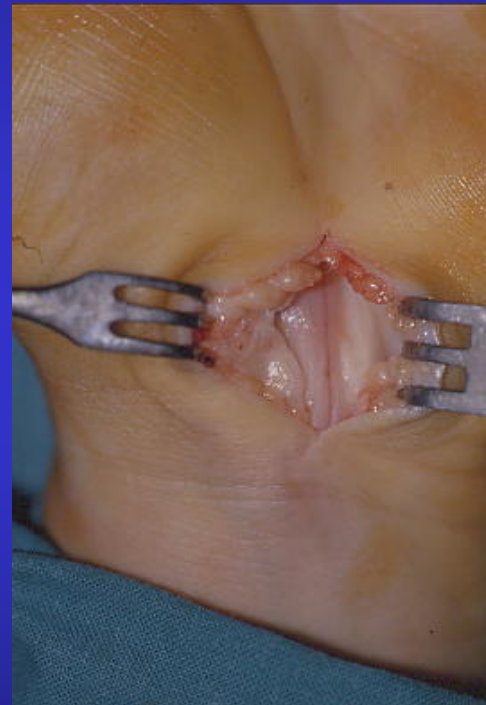
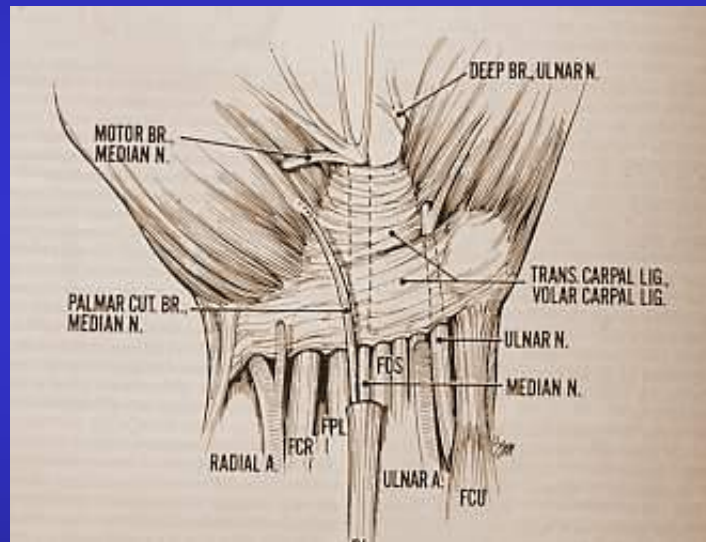
**Emergenza del ramo
motore dal lato
ulnare del nervo**



**Emergenza del ramo
motore prossimalmente
al lig. trasverso**



Varianti anatomiche del nervo (Ramo sensitivo)



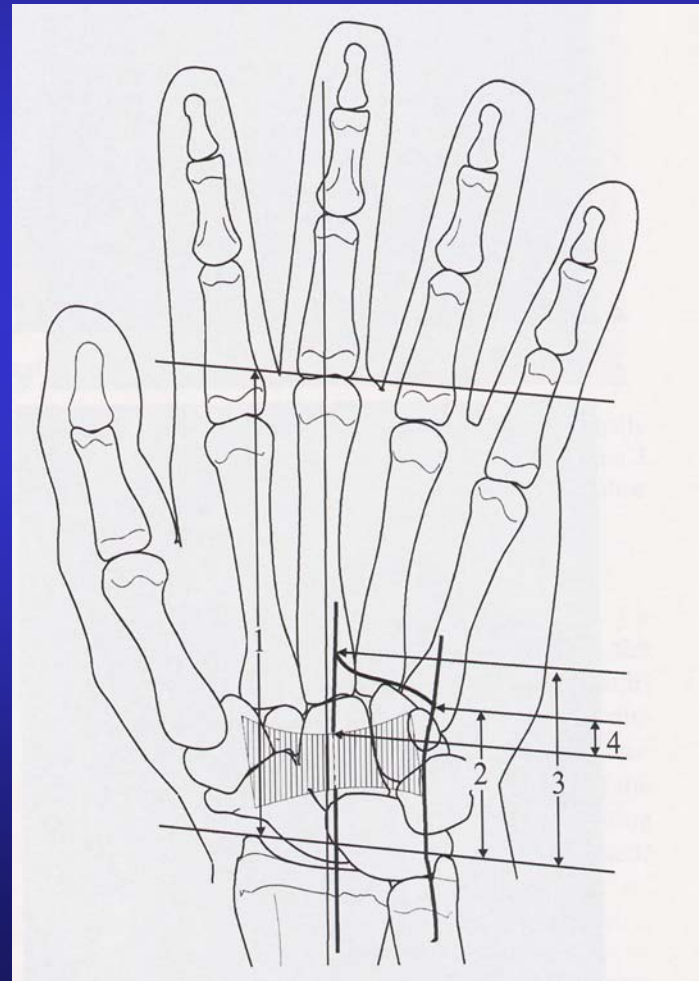
Anastomosi al palmo della mano tra nervo mediano e nervo ulnare

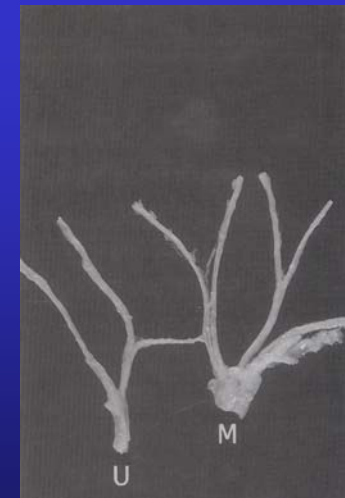
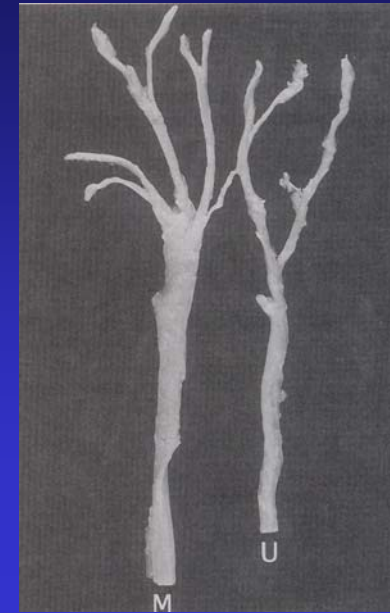
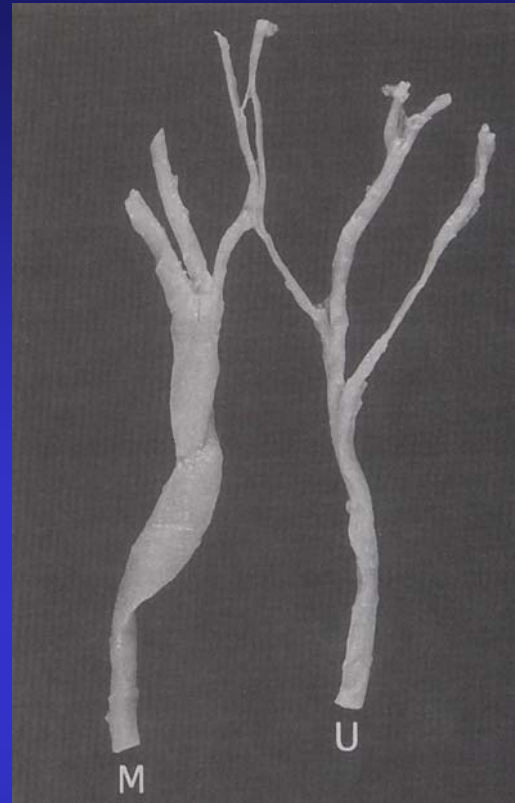
Anatomic Study of the Ramus Communicans Between the Ulnar and Median Nerves

J. Peter W. Don Griot, MD, J. Michiel Zuidam, MD,
E. Oscar van Kooten, MD, Lucian Poliacu Prosé, PhD,
J. Joris Hage, MD, PhD, *Amsterdam, The Netherlands*

The communicating branch between the fourth and third common digital nerves in the palm of the hand was studied. The incidence and branching pattern were studied in 53 dissected cadaveric hands. The "danger zone" in which the nerve is at risk during surgery was established using morphometric data. A communicating branch was found in 50 hands. It originated proximally from the fourth common digital nerve to join the third common digital nerve distally in 44 hands and traversed perpendicularly between the third and fourth common digital nerves in 4 hands. In the 2 remaining hands the branch left the third common digital nerve proximally to join the fourth digital common nerve distally. In 90% of the hands the ramus communicans crossed over in the middle third of the palm of the hand. As a cautious measure, hand surgeons should take into account that this structure could cross over anywhere in the middle three fifths of the palm. (*J Hand Surg* 2000;25A:948-954. Copyright © 2000 by the American Society for Surgery of the Hand.)

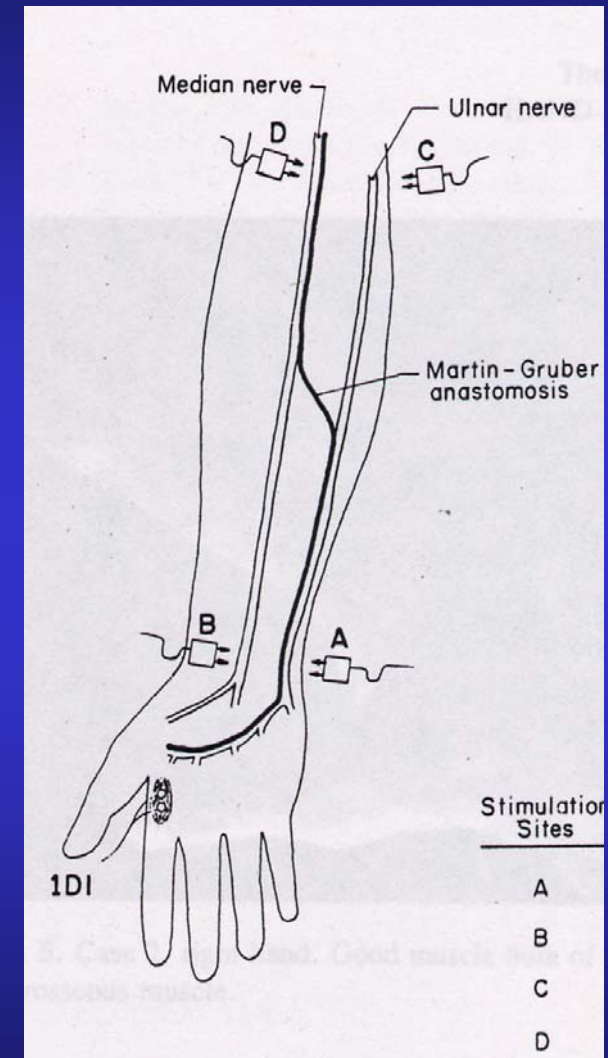
Key words: Surgical anatomy, ulnar nerve, median nerve, communicating branch, cadaveric study.





**Anastomosi mediano ulnare al
palmo della mano**

**Anastomosi mediano ulnare
all'avambraccio (anastomosi di
Martin Gruber)**



Fattori etiopatogenetici

Schema 1. Fattori coinvolti nella genesi della sindrome del tunnel carpale

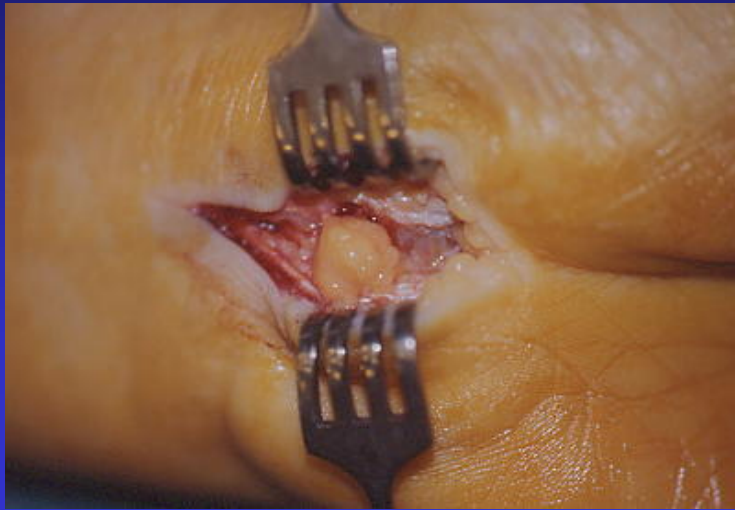
I. Anatomia		C. Alterazioni idroelettrolitiche	
A.	Diminuzione di volume del tunnel carpale	D.	Fattori congeniti
	1. Anomalie ossee delle ossa carpali		1. Mucopolisaccaridosi
	2. Ispessimento del legamento trasverso		2. Mucopolipidosi
B.	Aumento del contenuto del canale	III. Posizione ed utilizzo del polso	
	1. Neuroma	A.	Flessione ripetitiva forzata/ estensione (lavori manuali)
	2. Lipoma		B. Utilizzazione di strumenti a movimenti ripetitivi
	3. Mieloma	C.	Utilizzazione di strumenti vibranti
	4. Ventri muscolari ipertrofici		D. Atteggiamenti forzati a polso iper-esteso
	5. Persistenza dell'arteria mediana	E.	Immobilizzazione con polso flesso, in deviazione ulnare:
	6. Sinoviale ipertrofica		1. Apparecchi gessati dopo fratture di Colles
	7. Calli di frattura del radio distale		2. Postura di Awkward
	8. Osteofitosi post-traumatica		
	9. Ematomi		
II. Fisiologia			
A.	Condizioni neuropatiche		
	1. Diabete		
	2. Alcolismo		
B.	Condizioni infiammatorie		
	1. Tenosinoviti		
	2. Artrite reumatoide		
	3. Infezioni		
	4. Gotta		

Szabo RM Clin Orthop 351, 78, 1998

Fattori etiopatogenetici



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GF 42 aa
S.Tunnel carpale
da lipoma



VR 32 aa

**S.Tunnel carpale
da ipertrofia mm
palmare breve**

STADIAZIONE CLINICA

Precoce: riduzione trasporto assonale, disturbo circolo epineurale senza alteraz. morfologiche

Intermedia: edema epineurale ed interfascicolare

Avanzata: edema e fibrosi endoneurale

Acuta: quadro neurofisiopatologico in relazione alla patologia ed alla sua data di insorgenza

STADIAZIONE CLINICA

Precoce: STC dinamica (sint. Lieve, intermittente)

Intermedia: parestesie persistenti, “numbness”, tests clinici positivi, ritardo VdC motoria

Avanzata: deficit sensitivo e motorio

Acuta: traumi diretti, fratture, gravidanza, infezioni, trombosi arteria mediana, ematomi in emofilici ed in pz in trattamento con anticoagulanti

QUADRO CLINICO

Fase irritativa

- Parestesie soprattutto notturne
- Ipoestesia
- Tinel+
- Phalen+

Fase deficitaria

- Ipoestesia
- Ipotrofia mm tenari
- Ipovalidità pinza 1-2

Fase paralitica

- Atrofia eminenza tenare
- Ipoestesia grave
- Scomparsa parestesie e dolore



DIAGNOSI

- Quadro clinico ed anamnesi
- Rx
- EMG + VdC
- Ecografia
- RM, TC

Quadro clinico ed anamnesi



PR 52 aa
Pregressa ferita
puntiforme da vetro
con sviluppo di
neuroma in
continuità

DIAGNOSI

Test clinici



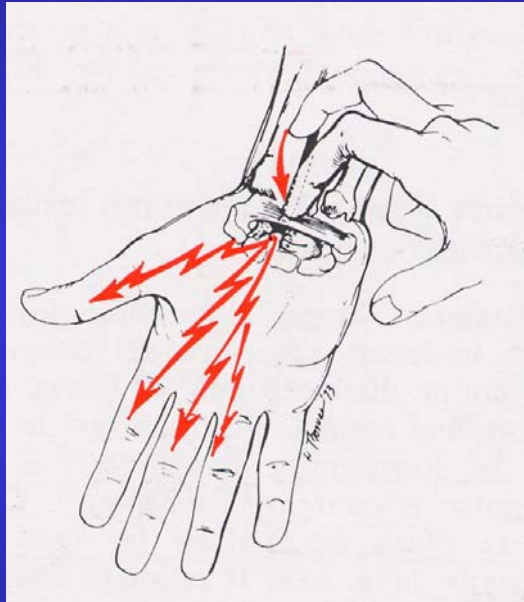
Wormser P
Fortsch Neurol Psych
18, 211, 1950



Phalen GS
J Bone Joint Surg
48A, 221, 1966

DIAGNOSI

Test clinici



Tinel J
Press Méd
23, 388, 1915



Test della pressione
Bilic R Pecina M
Acta Orthop Yugosl
17, 191, 1986

Bedeschi P
NON PUBBLICATO

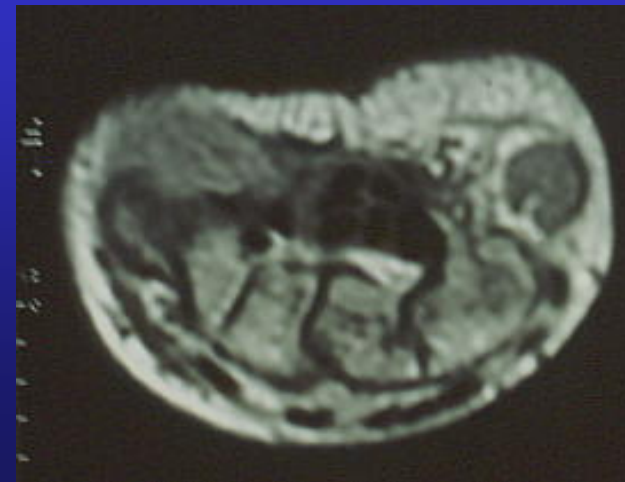
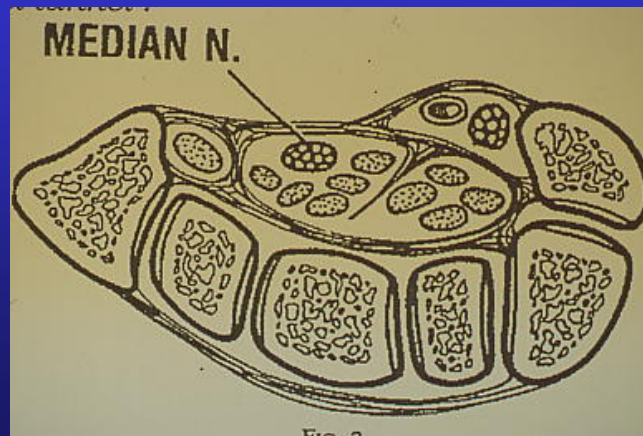
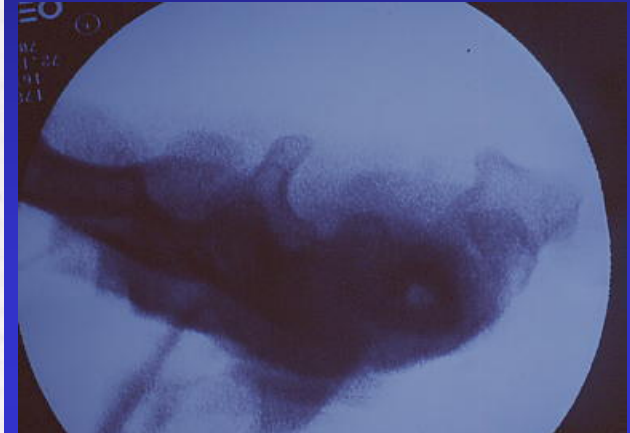
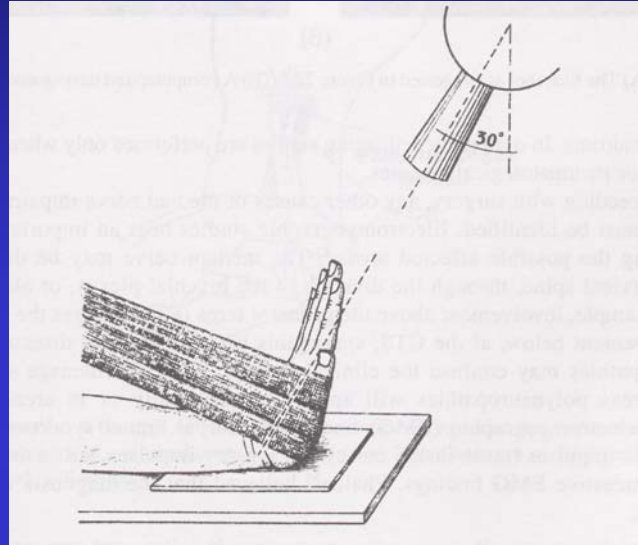
DIAGNOSI

TABLE 22.4
Various Tests Used to Diagnose Carpal Tunnel Syndrome

Test	Findings	Sensitivity	Time	Prognosis
Tinel's	Paresthesias or pain	80%		—
Phalen's	Paresthesias or pain	80%	Less than 1 min	—
Wormser (reverse Phalen)	Paresthesias or pain		Less than 1 min	—
Tourniquet	Paresthesias or pain	83%	15s	—
Thenar Atrophy	Decreased muscle bulk	36%		—
Pressure Test	Paresthesias		60 s (if > 10 s < 5 s)	—
	Hyperesthesia			Not Severe
	Hypoesthesia			Severe
Durkan's	Paresthesias or pain		Less than 30 s	—

DIAGNOSI

Rx, Ecografia,
TC, RNM



Compressione acuta

Applicazione di app.gessati intollerati

Fratture scomposte di polso

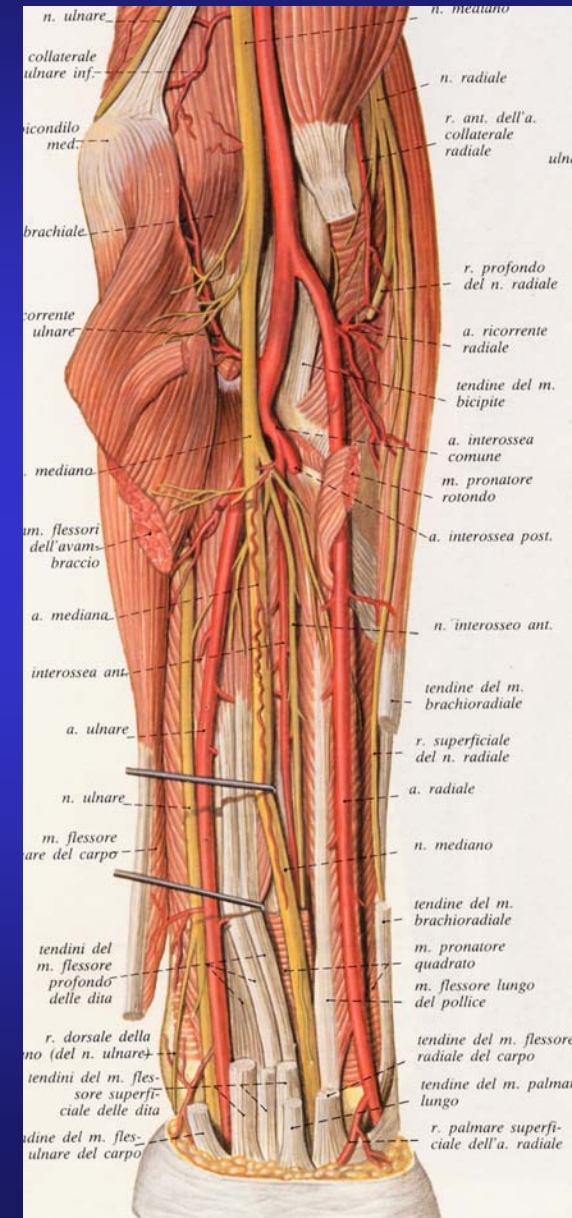
Trombosi A. Mediana persistente

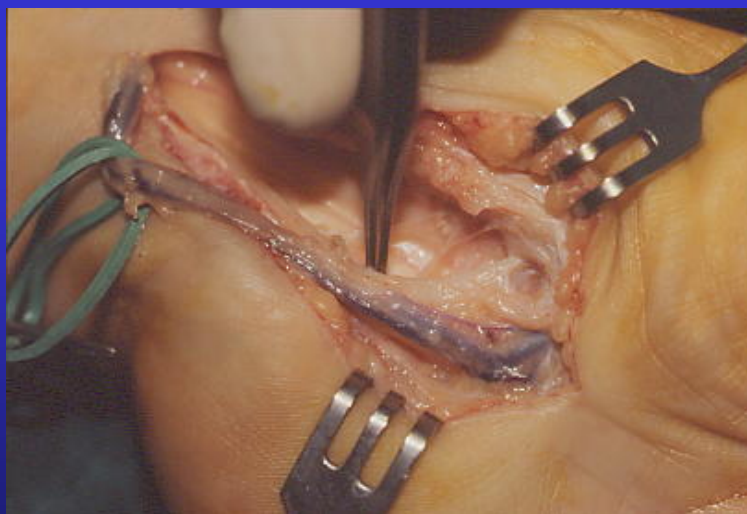
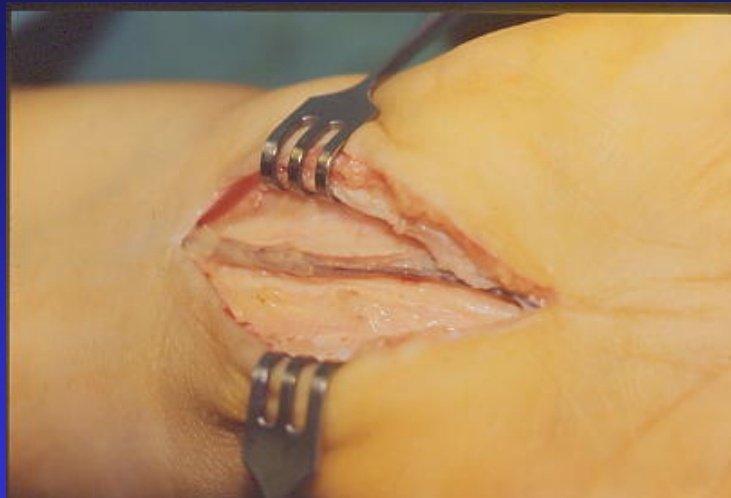
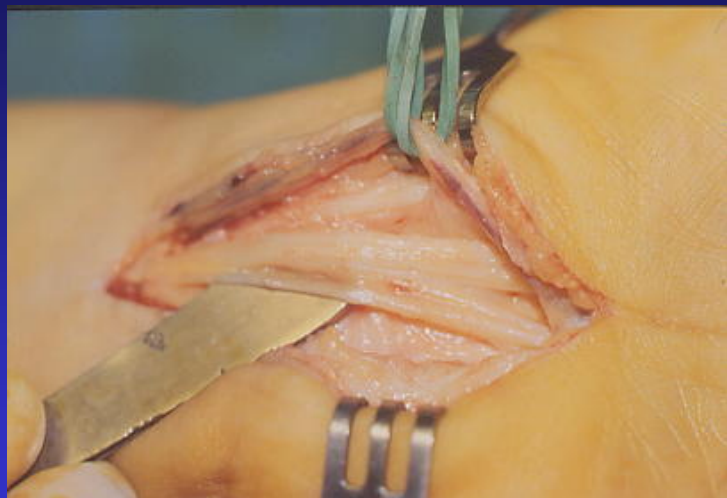
L'arteria mediana persistente se beante può dare una sintomatologia cronica

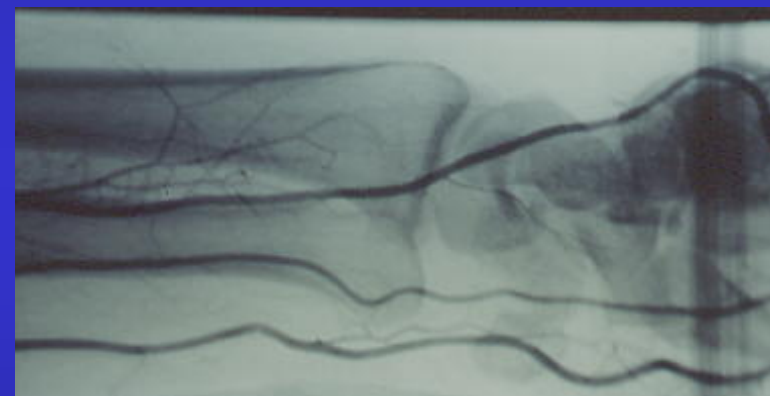
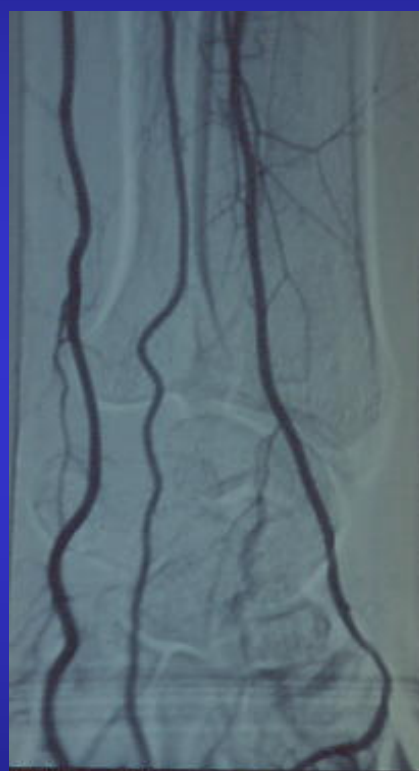
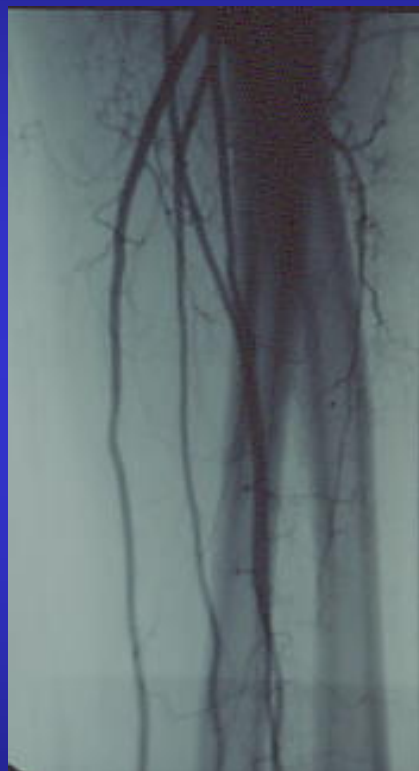
A. Mediana persistente

Srivastava descriveva su uno studio anatomico tre possibili varianti per l'A. mediana persistente:

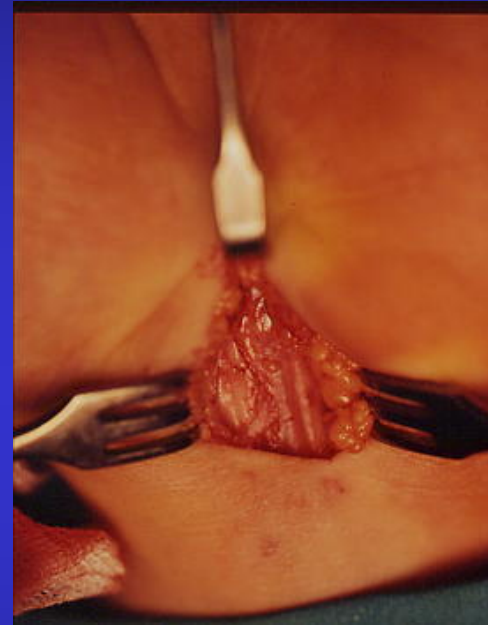
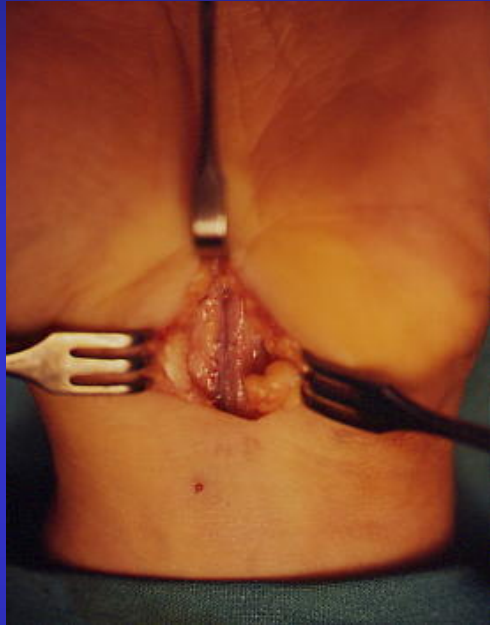
1. Interruzione al terzo medio avambraccio
2. Ramo che si getta nella arcata palmare superficiale
3. Ramo che da solo si porta al 3° dito

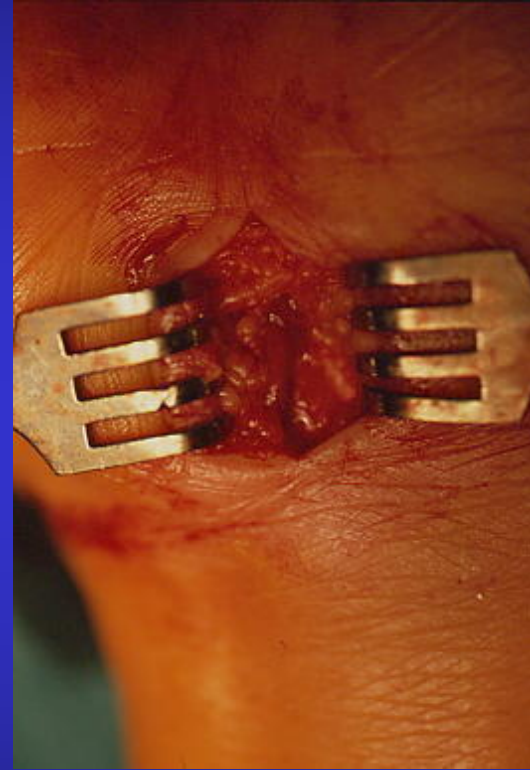
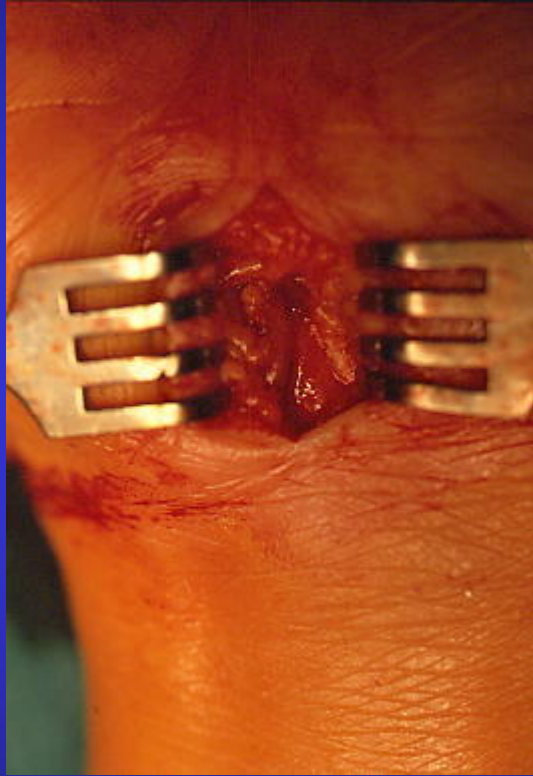






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TERAPIA

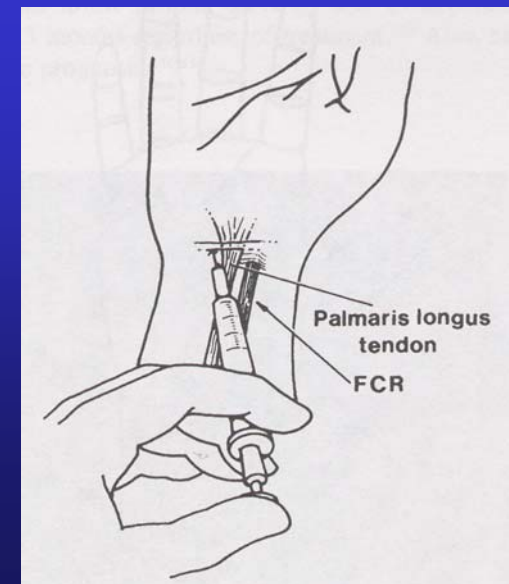
FKT (Bacinelle Galvaniche, Laser ecc)

Agopuntura

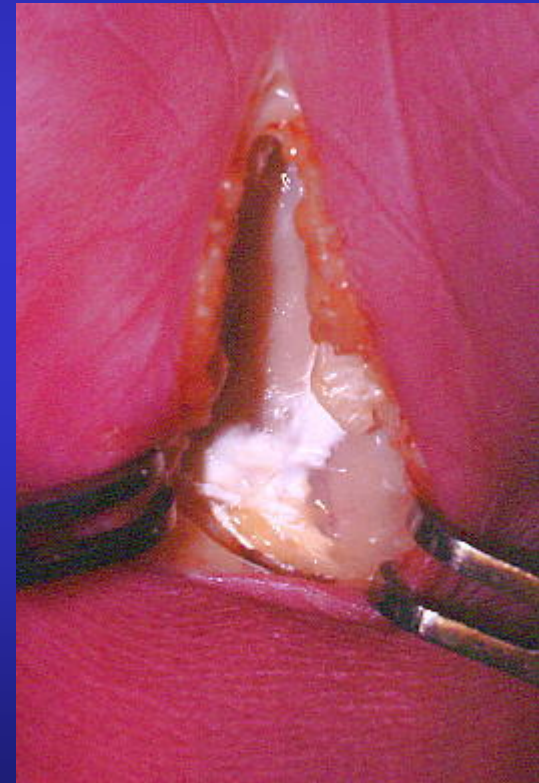
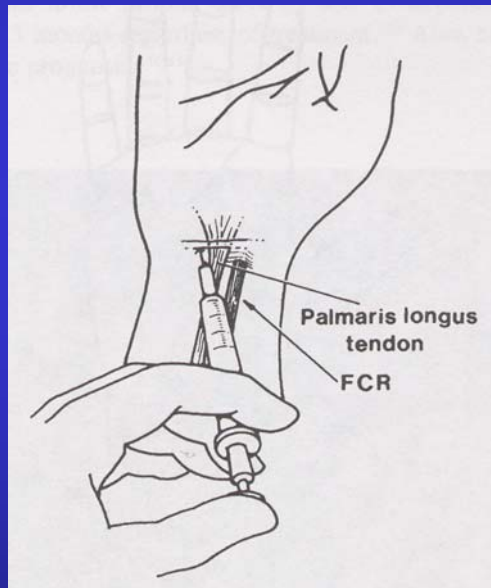
Splinting

Infiltrazioni locale solo in
alcuni casi con l'accortezza
di effettuarla sul lato ulnare

Farmaci neurotrofici



**Infiltrazioni solo come palliativo,
particolarmente utili in gravidanza**

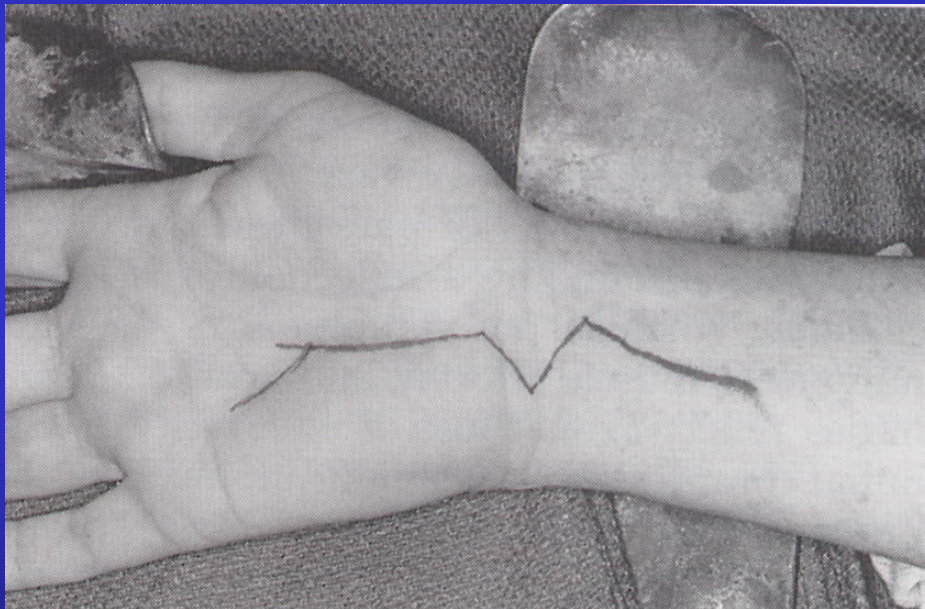


TERAPIA CHIRURGICA

Classica

Endoscopica

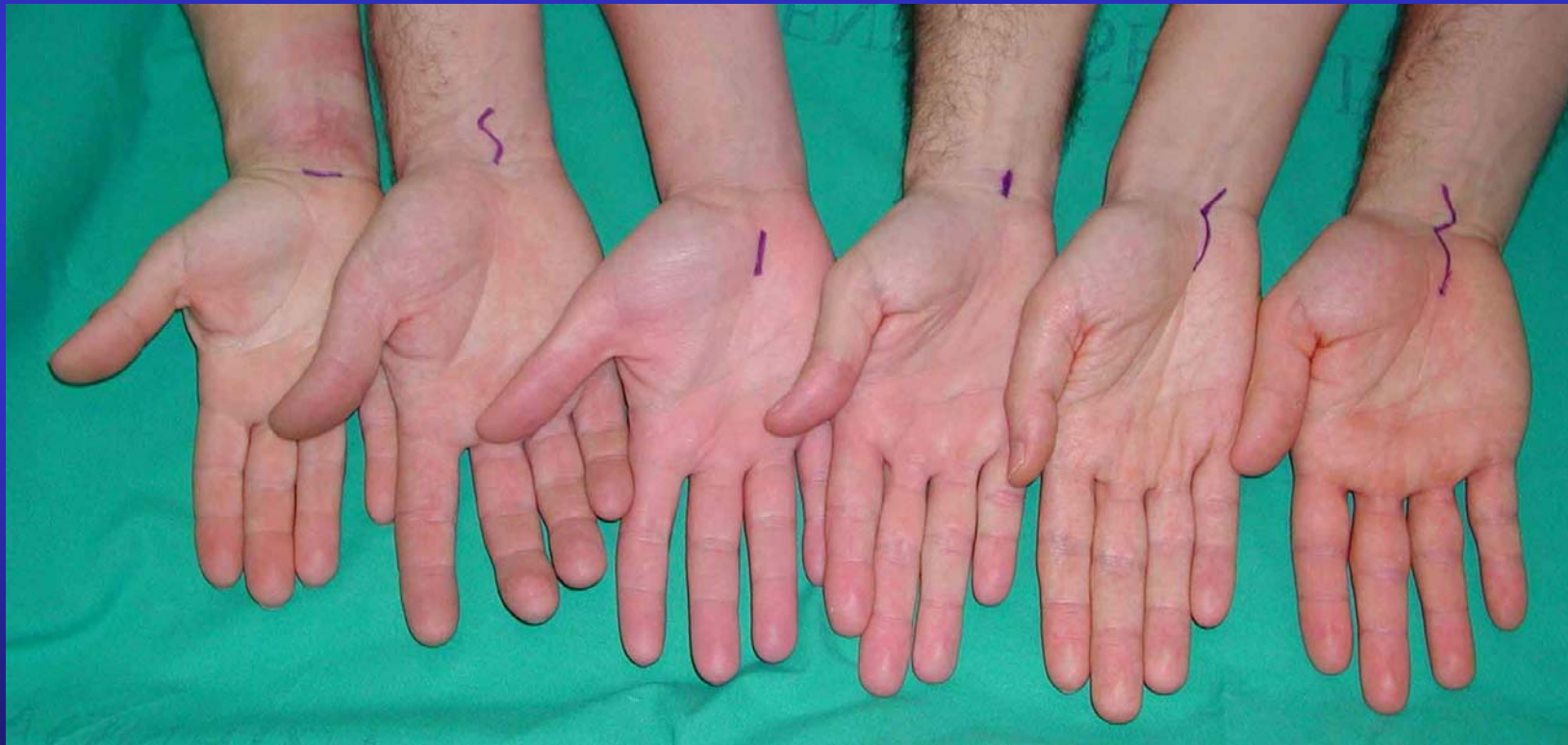
Incisione classica



Difetti

Inutilmente grande
Rettilinea al palmo

Incisioni nel tempo



Incisione ideale

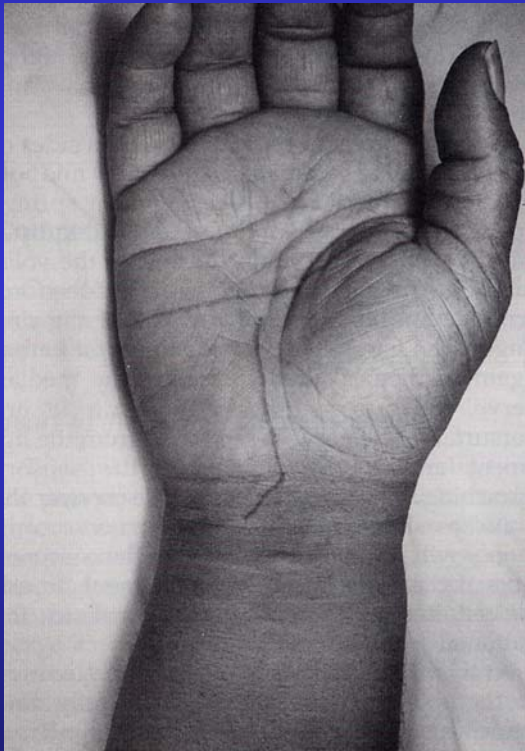
Non cadere direttamente sul nervo !!!

Rispettare la bolla di grasso di Bichat

Non essere troppo ampia

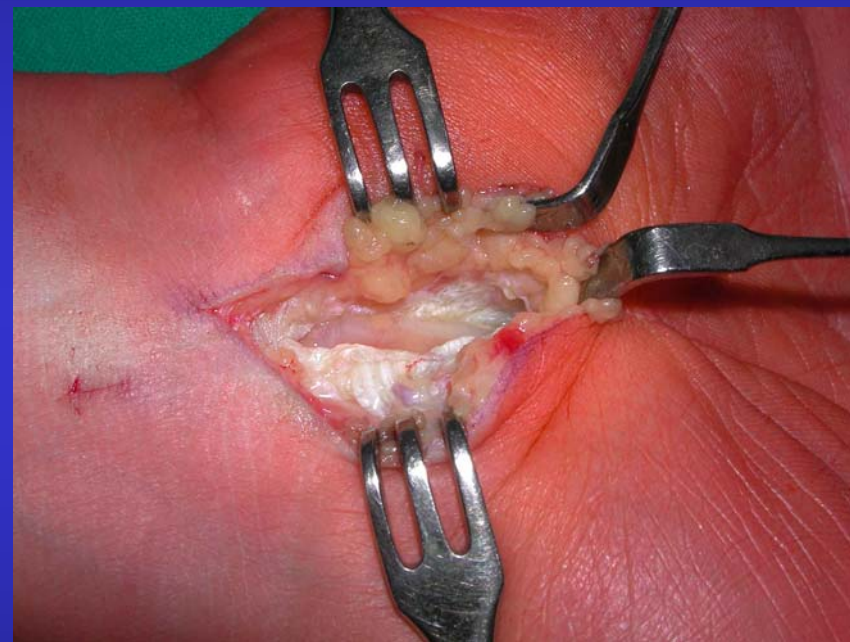
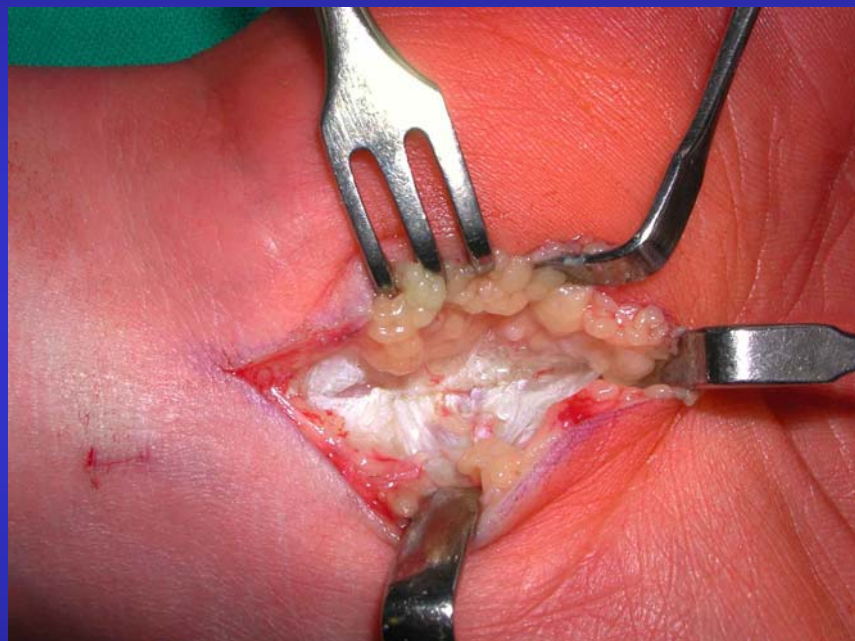
Non essere troppo piccola

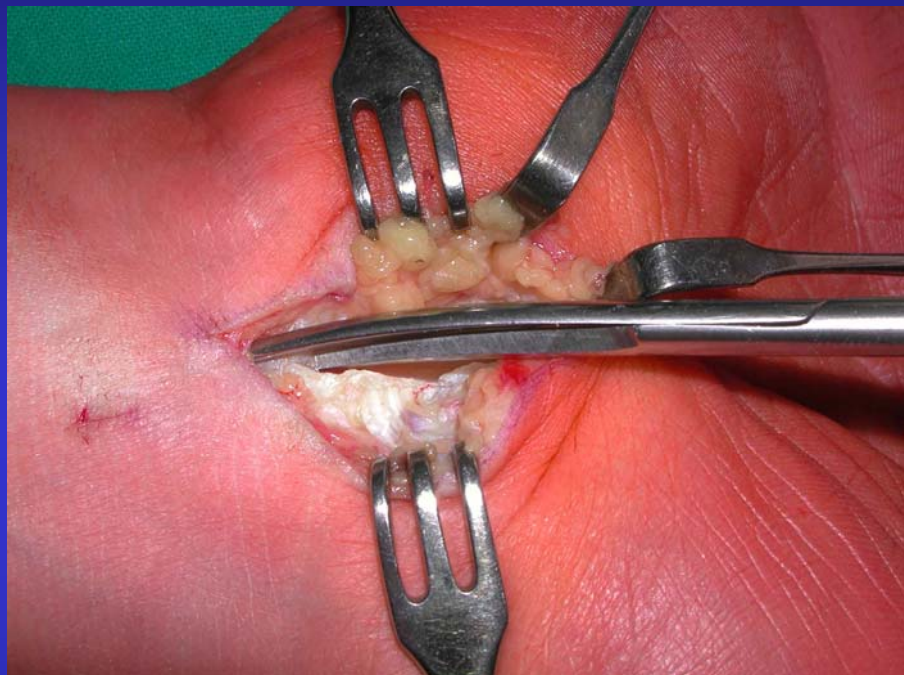
Incisione più utilizzata



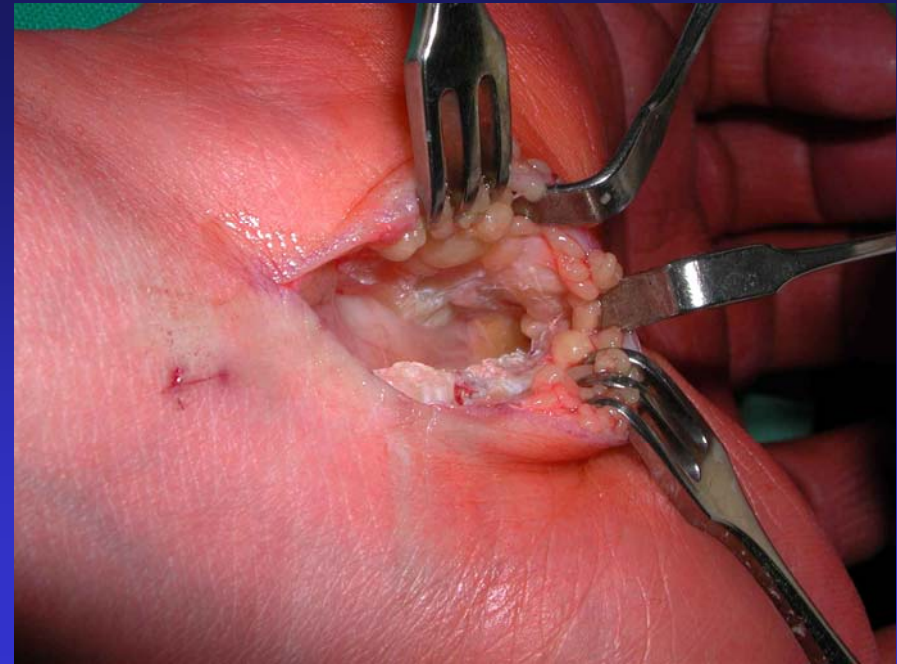
Intervento a cielo aperto







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Talora (accessorio)

asportazione di parte del ligamento trasverso

Ispezione del pavimento del tunnel

Sinoviectomia solo in presenza di panno !

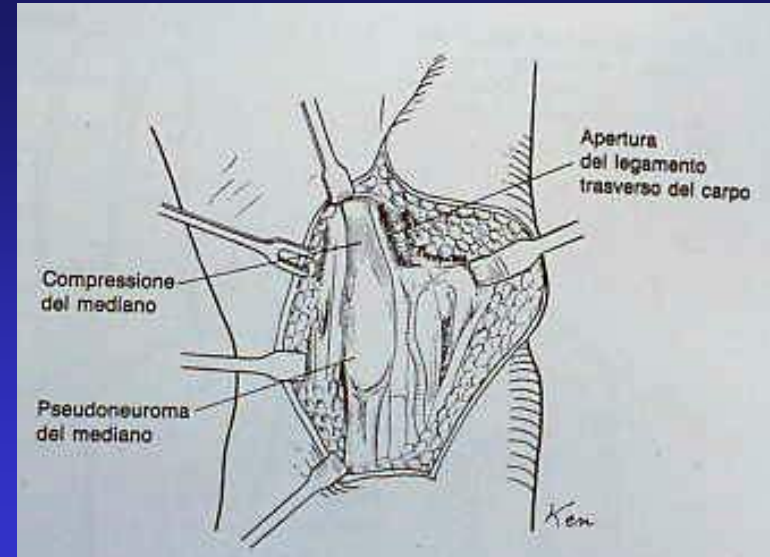
NO Neurolisi interfascicolare

Alla fine dell'intervento applicazione di bendaggio compressivo per 7-10 gg, quindi medicazione a piatto.

Desutura a 12-14 gg

Stecca gessata solo in caso di estese sinoviectomie

**Alla sezione del
ligamento si
reperita una
dilatazione
(pseudoneuro
ma) del nervo
a monte, con
stasi venosa da
compressione
("gozzi
varicosi")**



**Risparmio della
bolla adiposa
di Bichat che
deve andare
poi a ricoprire
il nervo per
impedire la sua
aderenza ai
piani
superficiali**



La neurolisi interfascicolare non porta alcun vantaggio, tutt'altro !

Internal neurolysis fails to improve the results of primary carpal tunnel decompression

This prospective, randomized study compares two treatment methods in patients with primary carpal tunnel syndrome. Decompression of the transverse carpal ligament was done in thirty-two hands (thirty patients) and decompression of the transverse carpal ligament with the addition of an internal neurolysis of the median nerve was done in thirty-one hands (twenty-nine patients). Relief of symptoms was described in eighty-eight percent of the patients with carpal ligament release and eighty-one percent of patients with carpal ligament release plus internal neurolysis. Improvement in hand sensibility testing, in thenar muscle strength, and atrophy was noted in both treatment groups with no statistical difference between groups. The addition of an internal neurolysis to division of the transverse carpal ligament does not add significant improvement in the sensory or motor outcome of patients with primary carpal tunnel syndrome. (J HAND SURG 1991;16A:211-18.)

S. E. Mackinnon, MD, FRCS(C), FACS, S. McCabe, MD, FRCS(C),
J. F. Murray, MD, FRCS(C), J. P. Szalai, PhD, L. Kelly, OT, C. Novak, BSc,
B. Kin, ScPT, and G. M. Burke, *Toronto, Ont., Canada*



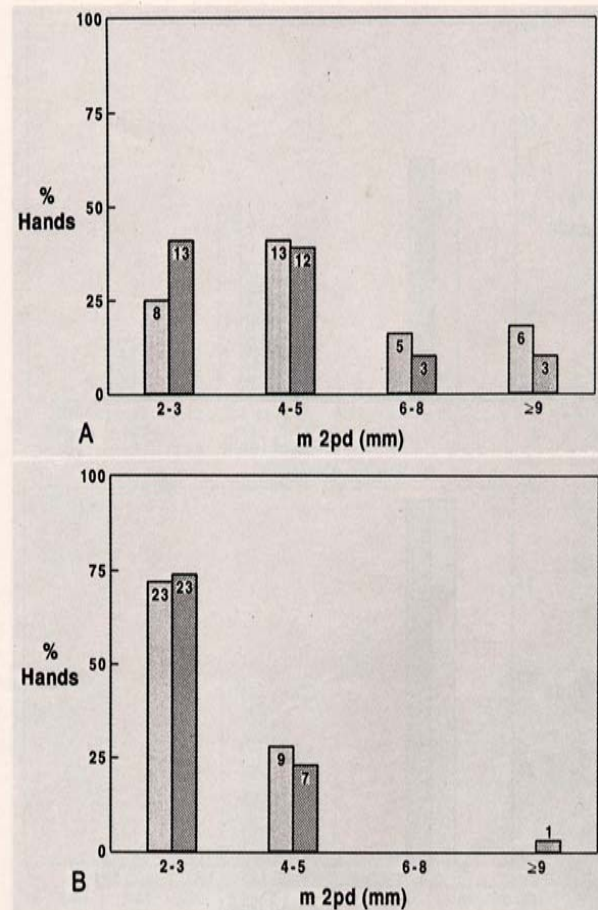


Fig. 1. A, Preoperative moving two-point discrimination (m2pd) in mm. **B,** Postoperative values of m2pd. The numbers within the bars represent the number of patients. Patients randomized to decompression (▨). Patients randomized to decompression plus neurolysis (▩). There was no statistical difference in the distribution pattern of preoperative moving two-point discrimination between the two groups. There is improvement in postoperative m2pd but no statistical difference in the distribution of m2pd between the two groups.

Table III. Thenar muscle atrophy (number of hands)

	Preoperative		Postoperative	
	Decompression	Neurolysis	Decompression	Neurolysis
None	10	12	19	20
Mild	11	10	10	8
Moderate	5	3	2	1
Severe	6	6	1	2

Table IV. Thenar muscle strength (number of hands)

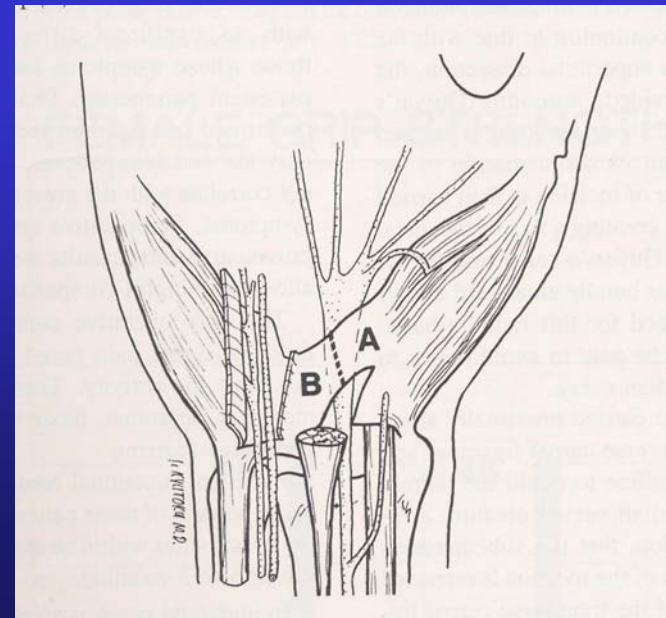
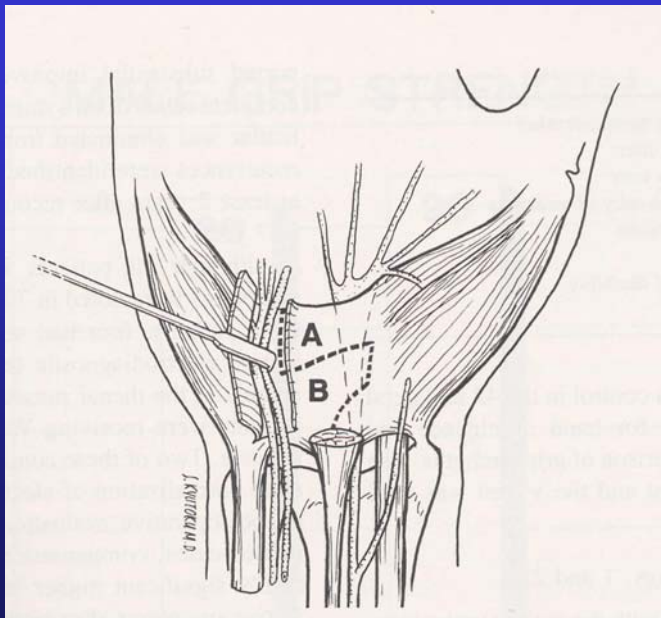
Grade	Preoperative		Postoperative	
	Decompression	Neurolysis	Decompression	Neurolysis
0-1	3	2	0	0
2-3	14	13	5	5
4-5	15	16	27	26

Sezionando il ligamento trasverso del carpo si ha comunque una certa perdita di forza in flessione per l'abolizione della più grossa puleggia flessoria

Transverse carpal ligament reconstruction in surgery for carpal tunnel syndrome: A new technique

We present a two-year follow-up of a technique to reconstruct the transverse carpal ligament in surgery for carpal tunnel syndrome. The transverse carpal ligament is exposed through a four to five centimeter palmar incision in line with the axis of the ring finger. The ligament is divided in step-wise fashion, creating a distal radially-based flap and a proximal ulnarly-based flap. The apices of these flaps are approximated, lengthening the ligament six to ten millimeters. All seventy-three patients (one hundred-four hands) reported substantial improvement with 93% having complete resolution of symptoms. Ninety-seven percent returned to work (average disability, two months). There were no recurrences or significant operative complications. In those with unilateral reconstruction (60%), there was no diminution in grip strength ($p < 0.05$). This technique of transverse carpal ligament reconstruction stabilizes the transverse carpal arch, provides protection to the median nerve, prevents bowstringing of the flexor tendons, and maximizes postoperative grip strength. (J HAND SURG 1991;16A:202-6.)

Emery Jakab, MD, *Toledo, Ohio*, Doreen Ganos, MD, *Grand Rapids, Mich.*, and F. W. Cook, MD, *Flint, Mich.*



Compressione ramo sensitivo thenare

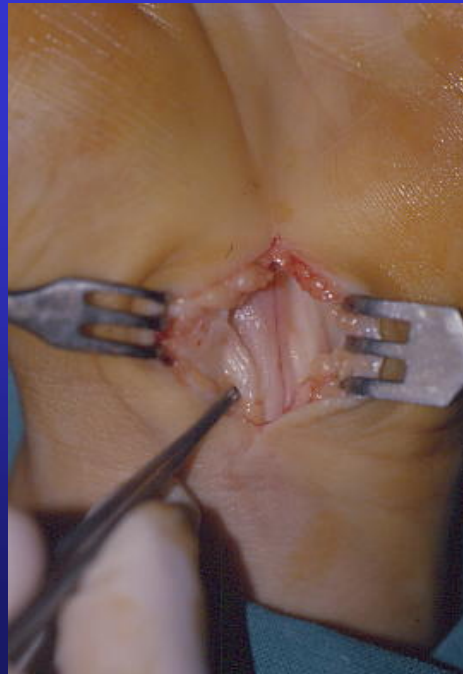
Quadro clinico:

Parestesie sull'eminanza tenare

Terapia:

Solo release del leg. Trasverso

Stellbrink J. 1972



FALLIMENTI

1. Recidive vere e proprie
2. Pillar Pain
3. Errore di tecnica
4. Errore di indicazione
5. "Imponderabile"

Recidive ed insuccessi nel 1,7-15%

O'Malley MJ J Hand Surg 17A, 638, 1992

Hulsizer DL J Hand Surg 23A, 865, 1998

Failure of Carpal Tunnel Decompression: Inadequate Proximal Release

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*Department of Orthopaedics, Royal United Hospital,
Combe Park, Bath BA1 3NG*

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Combe Park Bath BA1 3NG

Tel: 01225 824456

Fax: 01225 825526

IFSSH 2001

Su 20 recidive

Compressione prossimale 20 casi

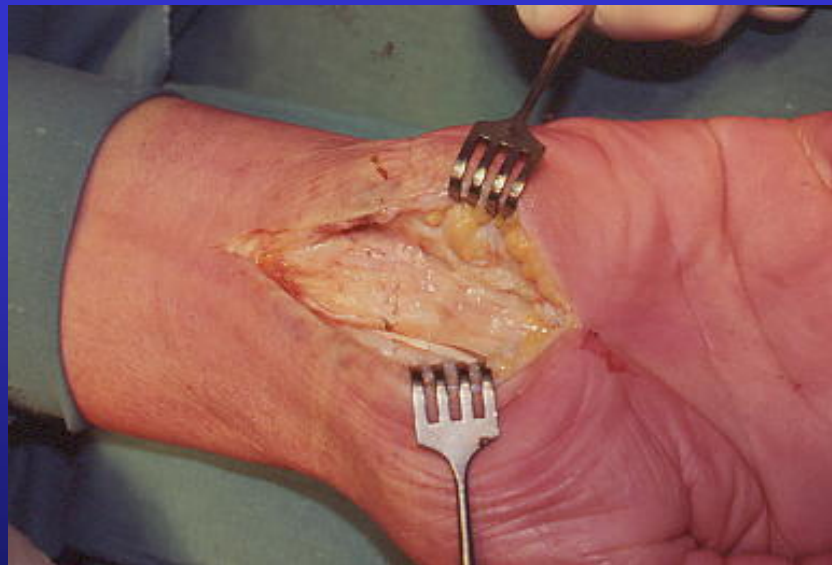
Compressione al lig. Trasverso 3 casi

Compressione distale al lig. Trasverso 3 casi

Altre 2 casi

Ustionati

Rappresentano un gruppo di pazienti dove i risultati sono peggiori per la cattiva qualità dei tessuti con tenaci fenomeni aderenziali ed alta incidenza di recidive



Dializzati

Carpal tunnel syndrome in long term hemodialysis patients

T. KALELI, O. KARAEMINOĞULLARI*,
K. DİLEK** and O. GEDİKOĞLU

*Department of Orthopedics
Uludag University School of Medicine, Bursa (TR)
* Department of Orthopedics, Abant İzzet Baysal
University School of Medicine, Düzce (TR)
** Department of Nephrology
Uludag University School of Medicine, Bursa (TR)*

Congress of
the International
Federation of
Societies for
Surgery of the Hand
IFSSH 98

Vancouver, Canada
24-28 May, 1998

Fenomeni amiloidosici e reazioni
tenosinovitiche ne peggiorano la
prognosi ed aumentano nettamente l'
incidenza di recidiva

Dializzati



RECIDIVE

Possibili strategie

Nuova neurolisi

Lembo di grasso della bolla di Bichat

Lembo a vela quadra

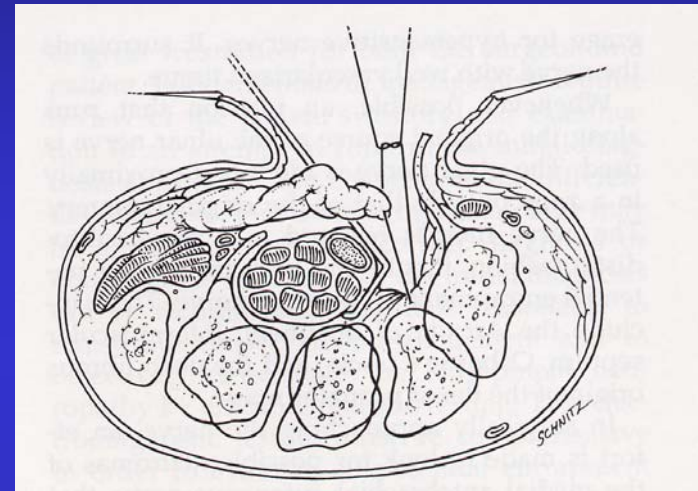
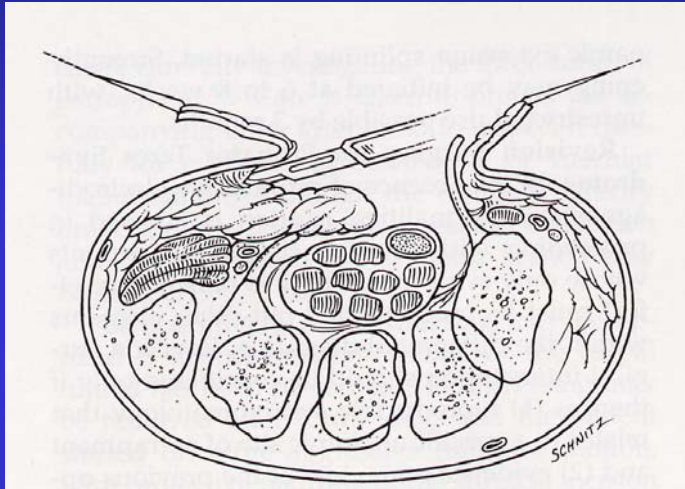
Lembo muscolare Ipothenare

Lembo di Becker & Gilbert

Nuova neurolisi



Lembo di grasso della bolla di Bichat



Lembo muscolare palmare breve

MARCH 1991
VOLUME 16A, NUMBER 2

Official journal
AMERICAN SOCIETY FOR SURGERY OF THE HAND

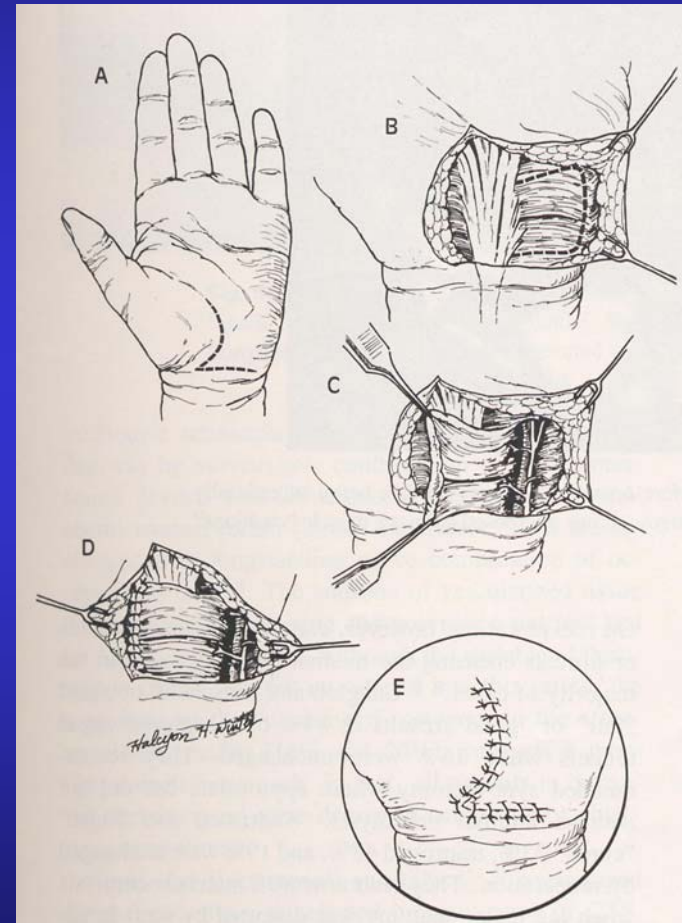
THE JOURNAL OF HAND SURGERY AMERICAN VOLUME

ORIGINAL COMMUNICATIONS

Palmaris brevis turnover flap as an adjunct to internal neurolysis of the chronically scarred median nerve in recurrent carpal tunnel syndrome

Thirteen hands in 11 patients with previous carpal tunnel releases were treated by microscopic internal neurolysis and palmaris brevis "turnover" flaps. All patients in the series had positive electrodiagnostic testing, dysesthetic wrist pain, and numbness in the median nerve distribution before operation. Average age was 41.9 years (range, 27 to 62 years). Ten were male and 3 were female. Range of follow-up after the procedure was from 1 to 1½ years. All hands with abnormal preoperative two-point discriminations or Semmes-Weinstein measurements showed numerical improvement in their sensory parameters. Thenar strength and bulk improved at least one grade in all six cases of thenar atrophy. Mean grip strength was 15.2% greater than before operation. Key pinch increased 5.5% and pulp pinch 31.9%. Subjective assessment of improvement ranged from 25% to 100%. All patients returned to their former jobs or to vocational retraining except the oldest patient who is semiretired. (J HAND SURG 1991;16A:191-201.)

Elliott H. Rose, MD, *New York, N.Y.*, Michael S. Norris, MD, *Stanford, Calif.*,
Thomas A. Kowalski, OTR, *Burlingame, Calif.*, Armand Lucas, MD, and
Earl J. Fiegler, MD, *Cleveland, Ohio*



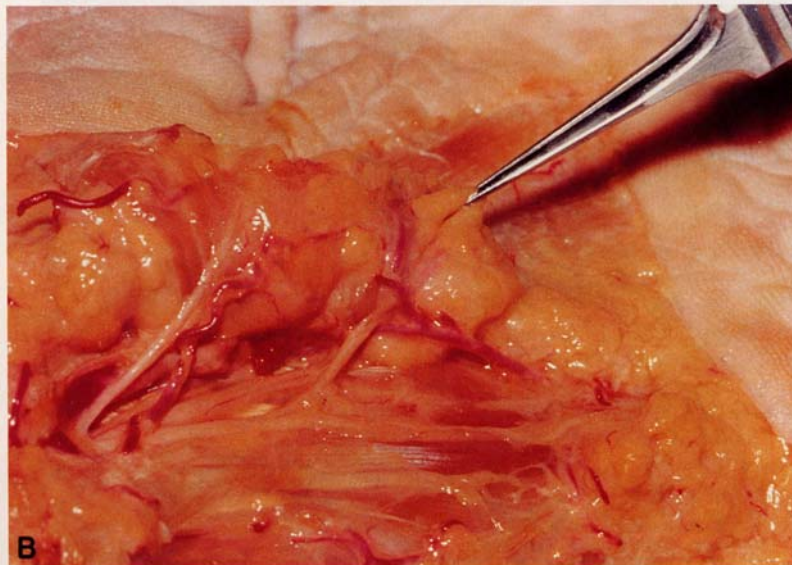
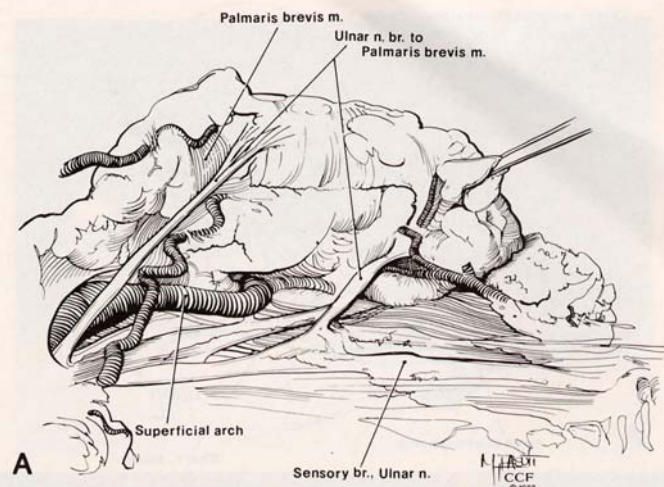


Fig. 1. A-B, Dual arterial blood supply to palmaris brevis muscle. These arteries usually arise from the deep palmar branch of the ulnar artery distal to its bifurcation.

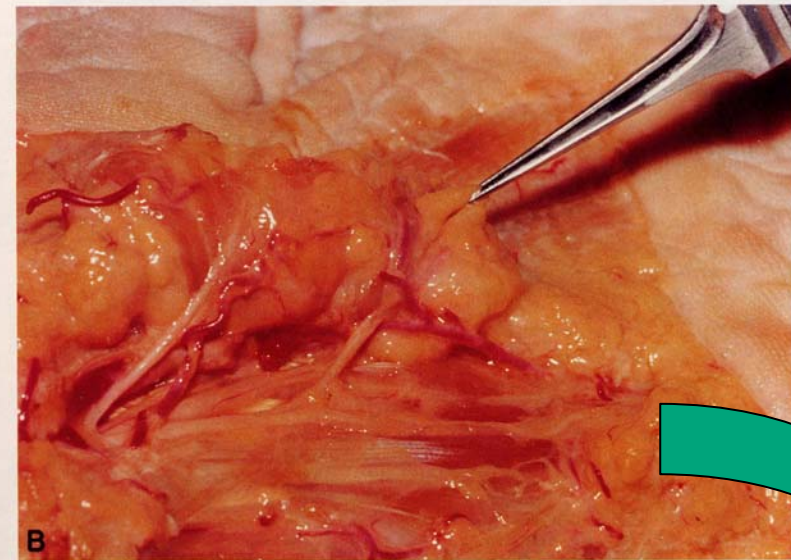
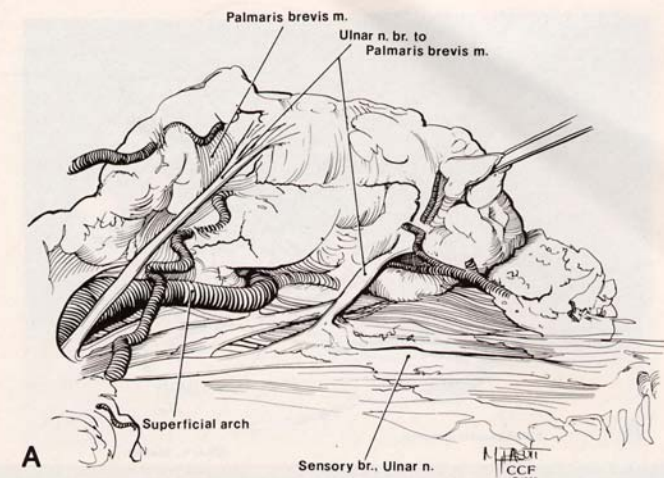
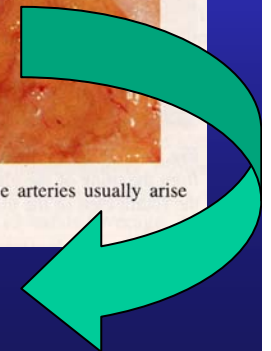
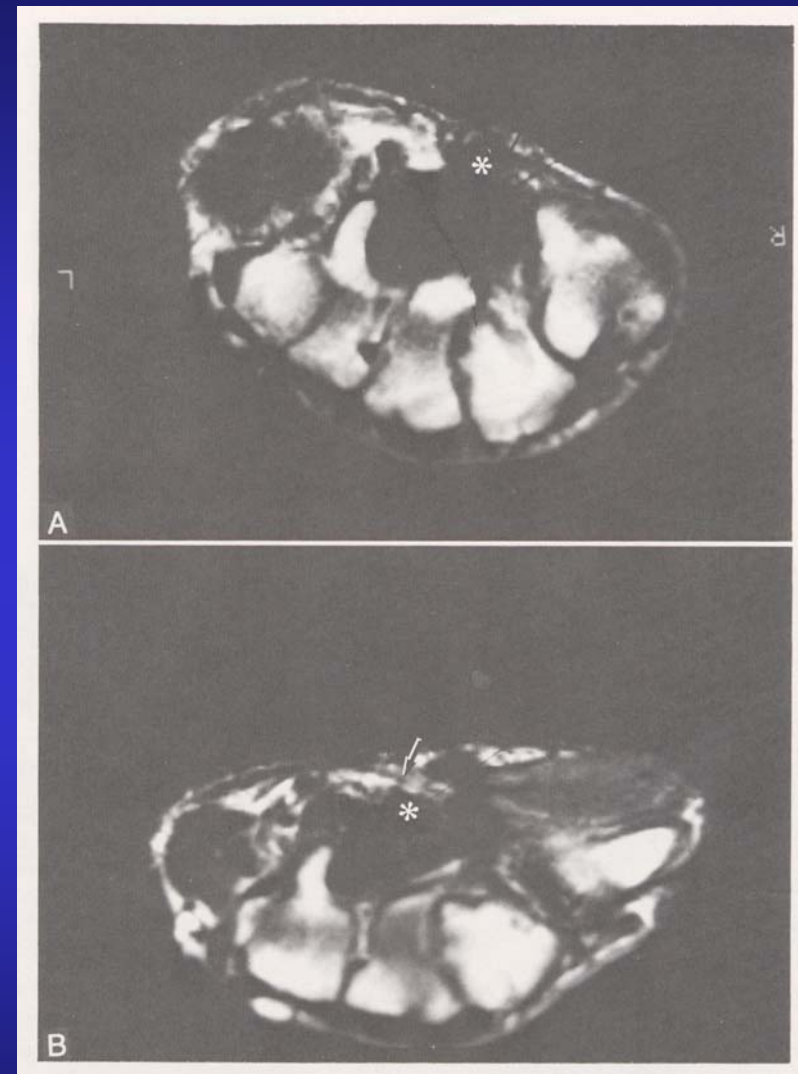
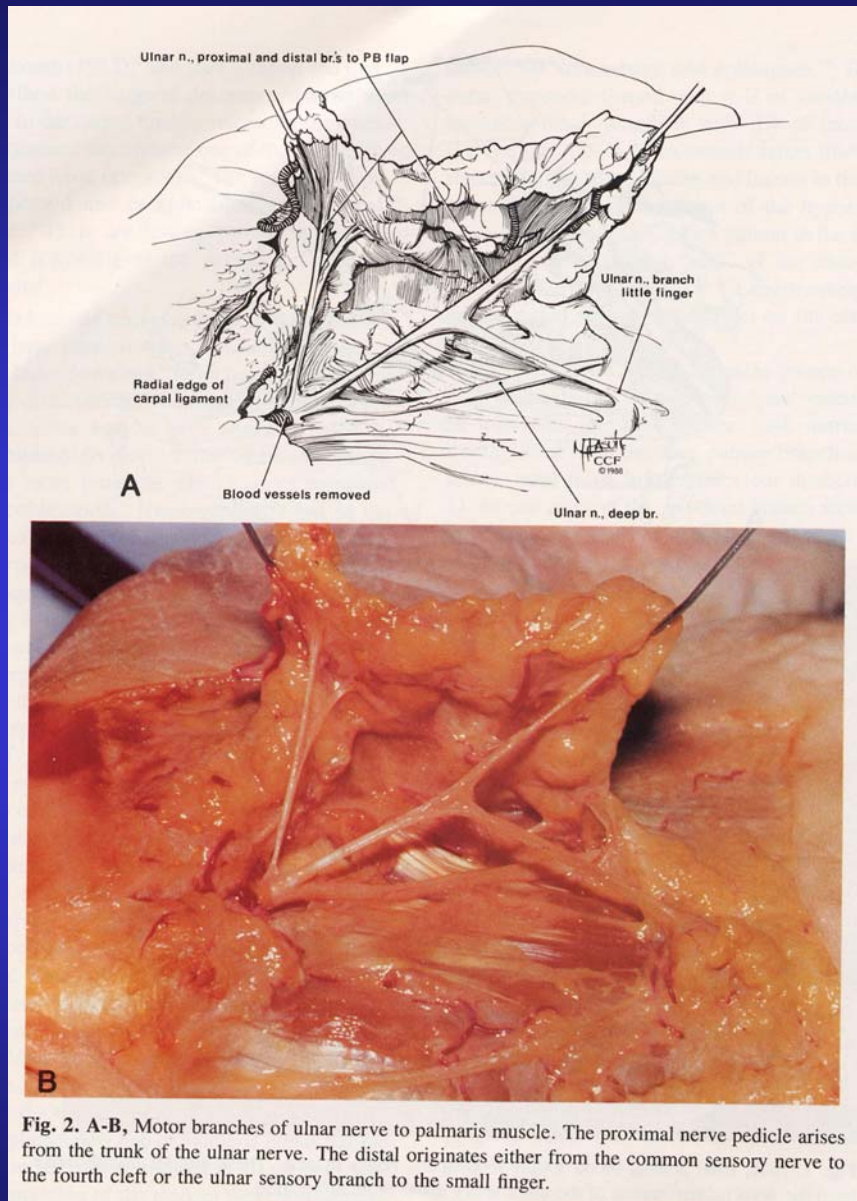


Fig. 1. A-B, Dual arterial blood supply to palmaris brevis muscle. These arteries usually arise from the deep palmar branch of the ulnar artery distal to its bifurcation.

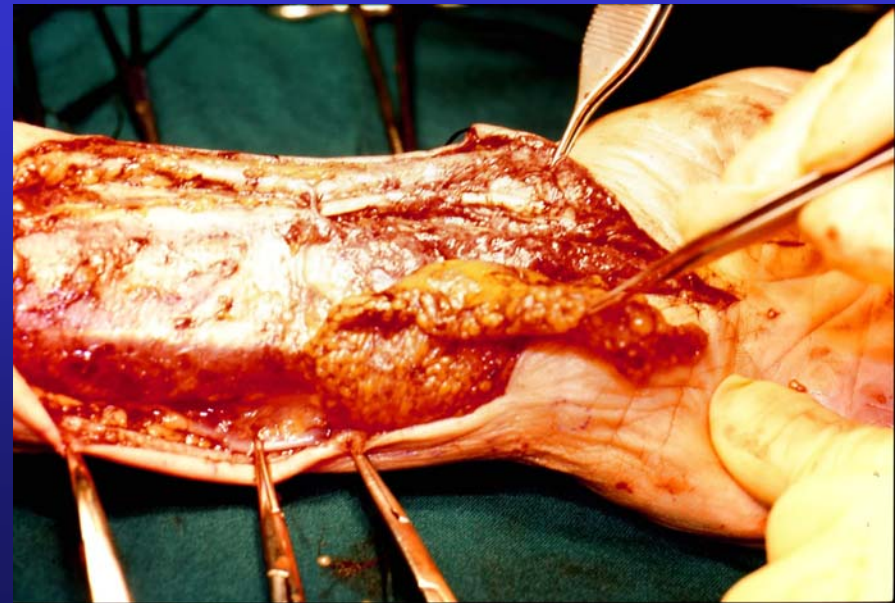
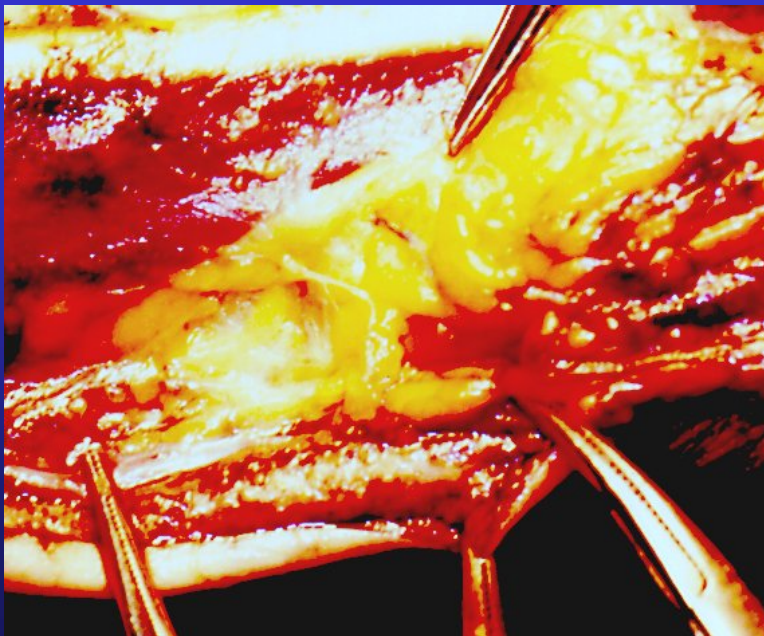
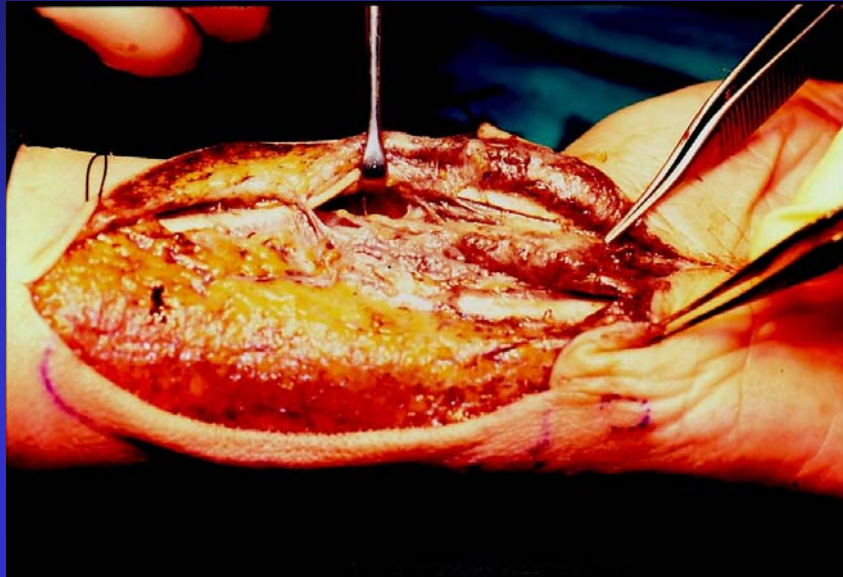




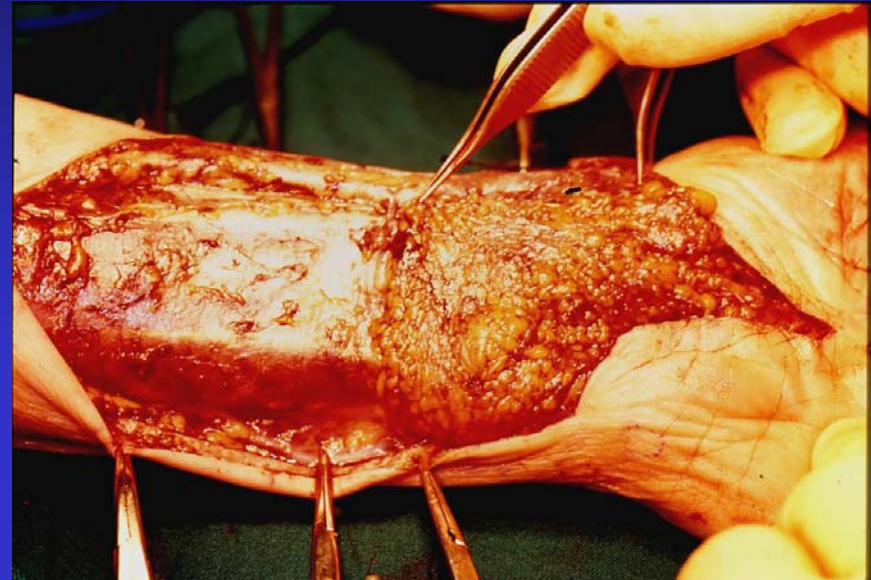
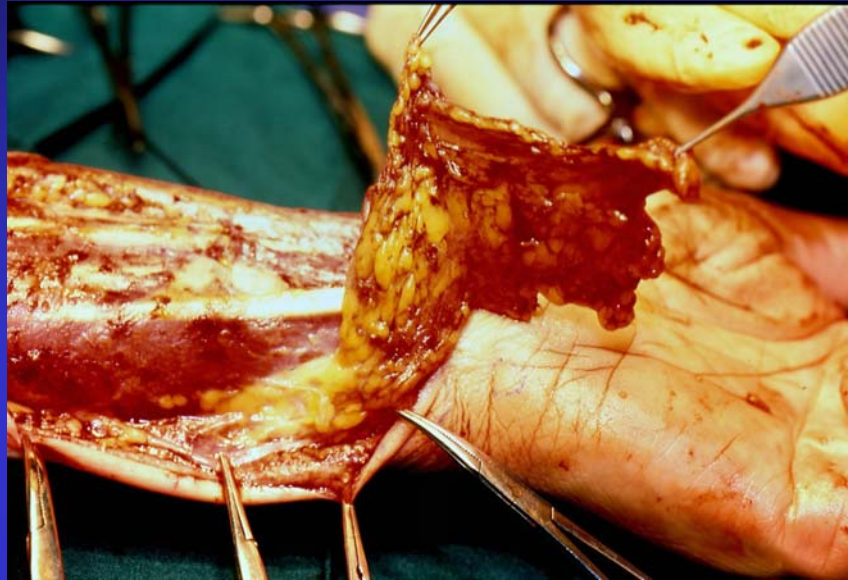
Lembo di Becker & Gilbert.1



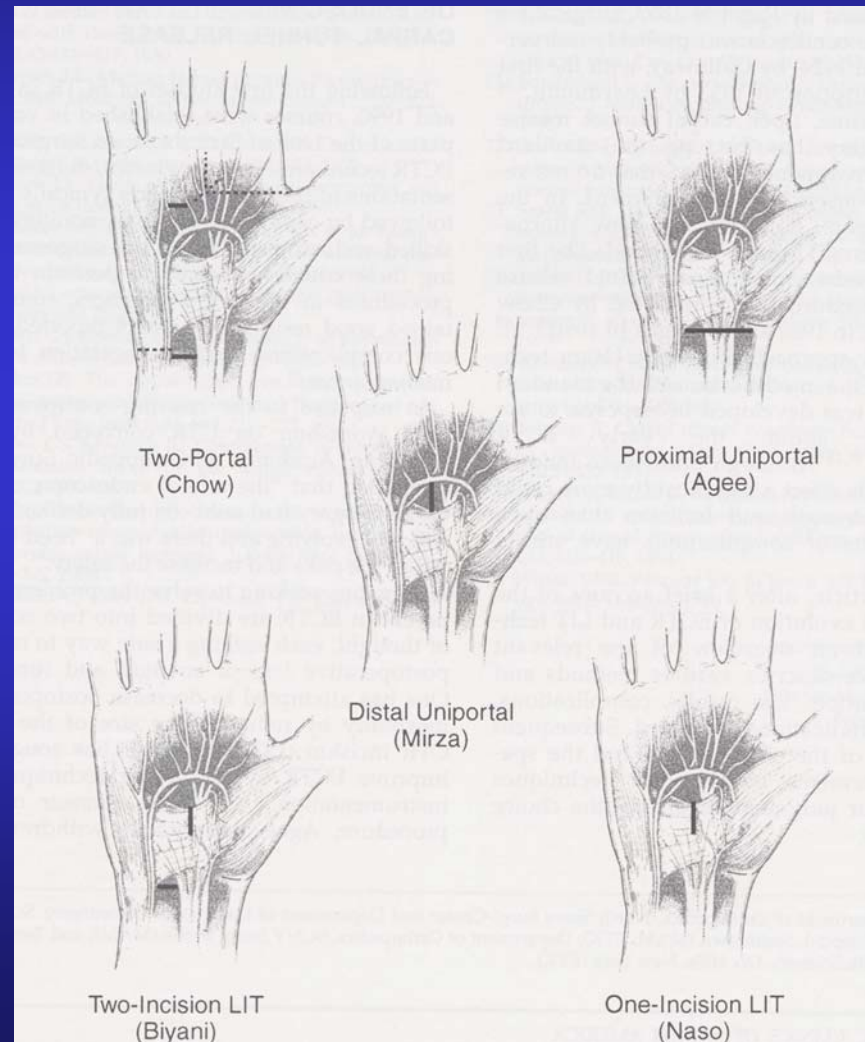
Lembo di Becker & Gilbert.2



Lembo di Becker & Gilbert.3



Tecniche endoscopiche



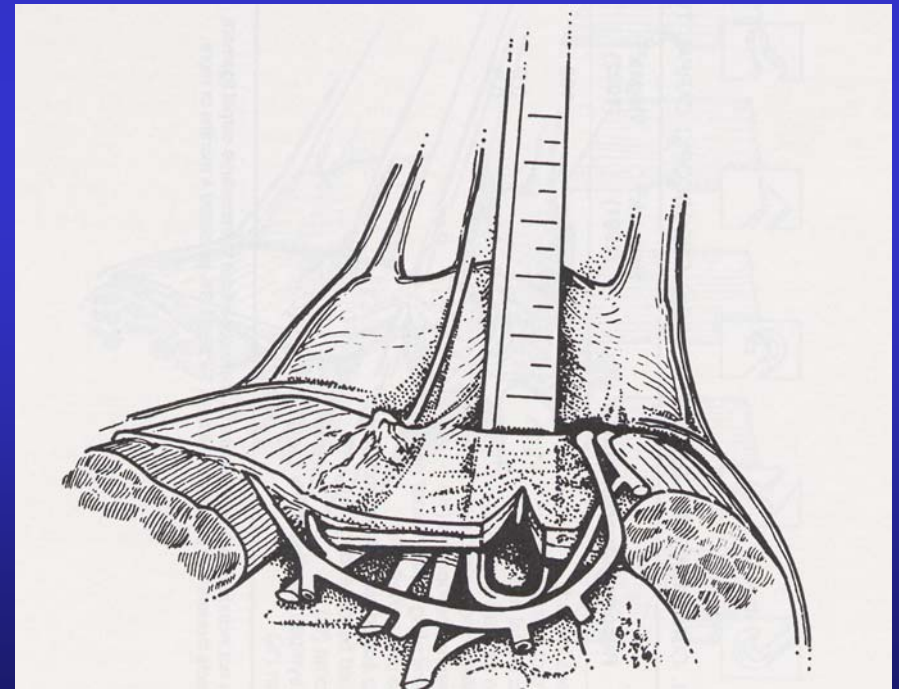
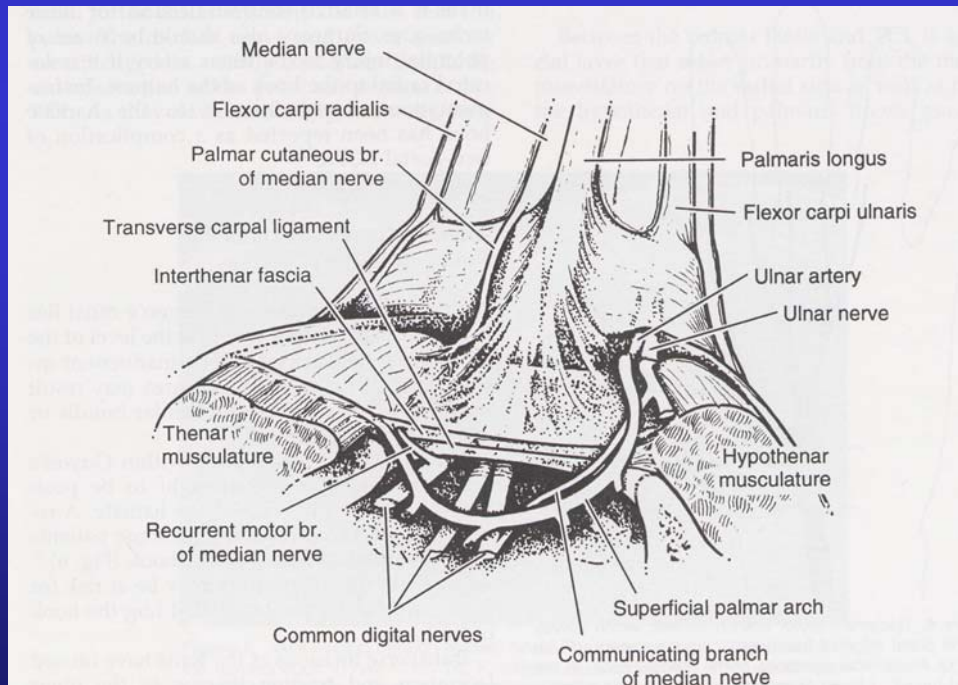
Tecnica di Agee

Endoscopic release of the carpal tunnel:
a randomized prospective multicenter

J Hand Surg 17A, 987, 1992



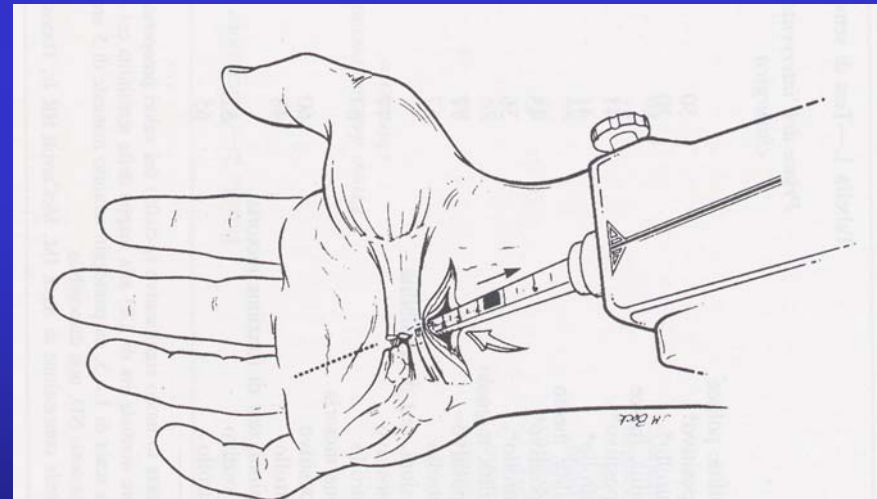
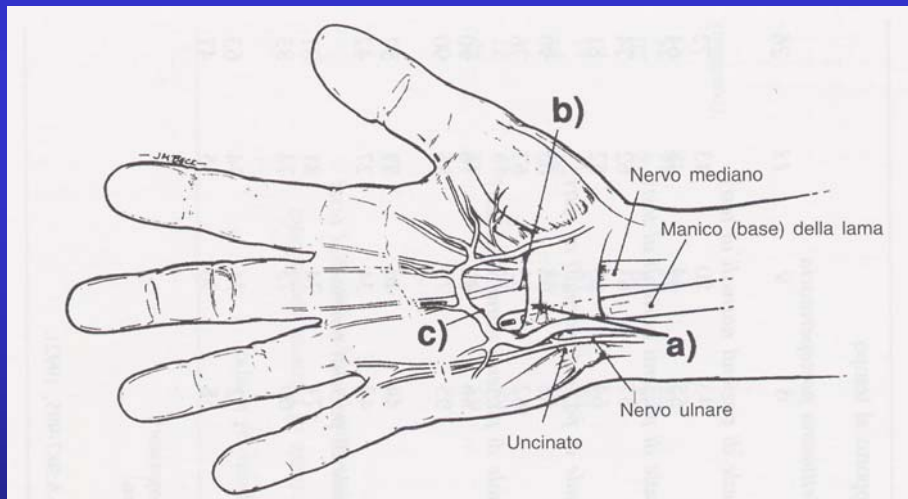
Tecnica di Agee
Endoscopic release of the carpal
tunnel: a randomized prospective
multicenter
J Hand Surg 17A, 987, 1992



Tecnica di Agee

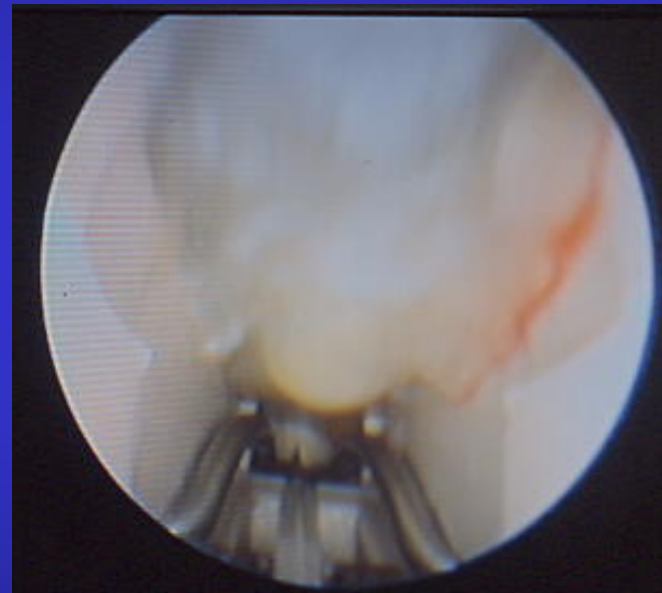
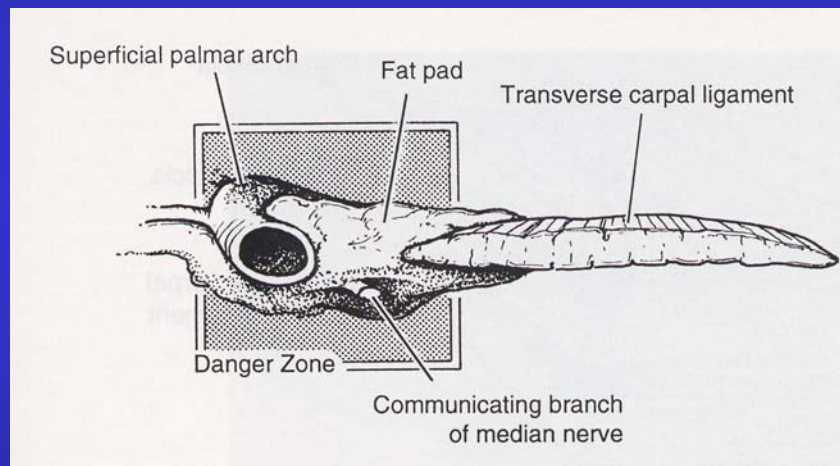
Endoscopic release of the carpal tunnel:
a randomized prospective multicenter

J Hand Surg 17A, 987, 1992



Misure di sicurezza.1

Quando il ligamento è finito
tornare indietro !!!



Misure di sicurezza.2

An anatomical study of the volar carpal canal

T. TANABE, I. OKUTSU*, I. HAMANAKA*
and S. NINOMIYA

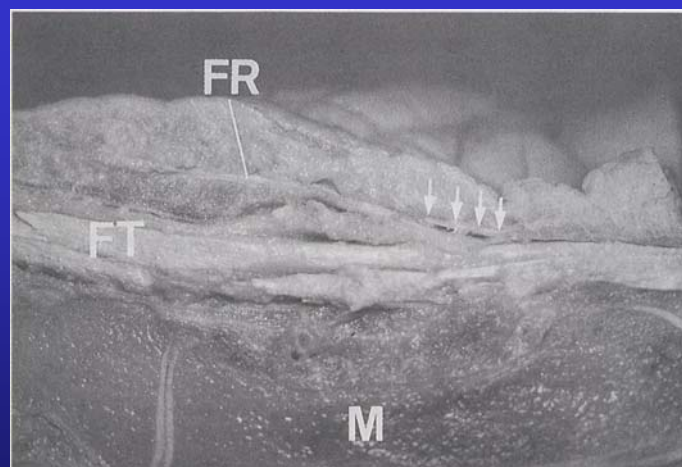
*Department of Orthopaedic Surgery
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Japanese Red Cross Medical Center, Tokyo (J)*

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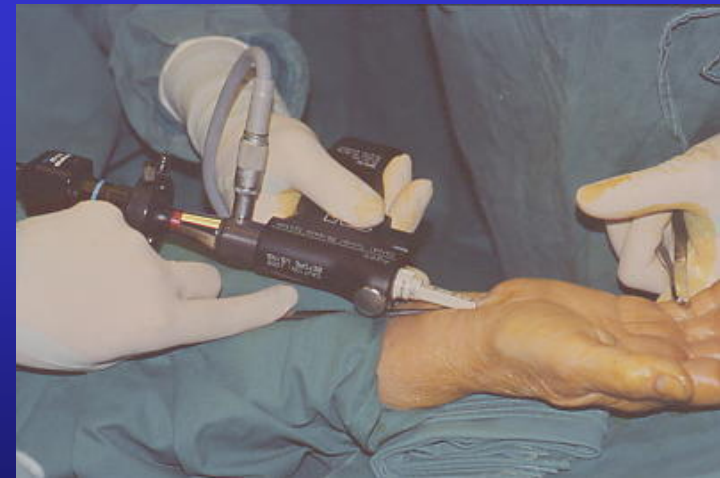
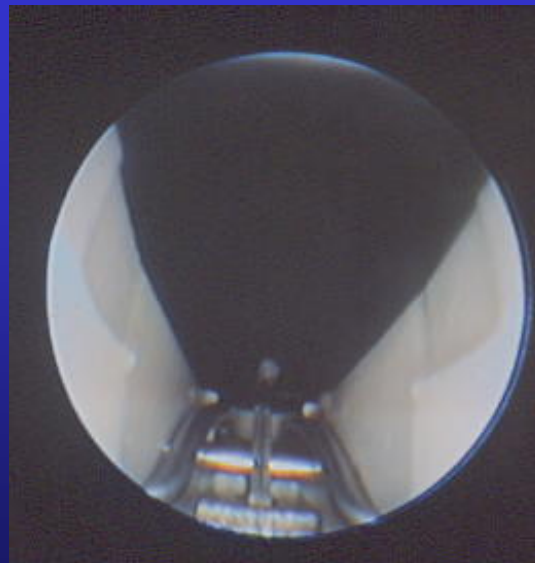
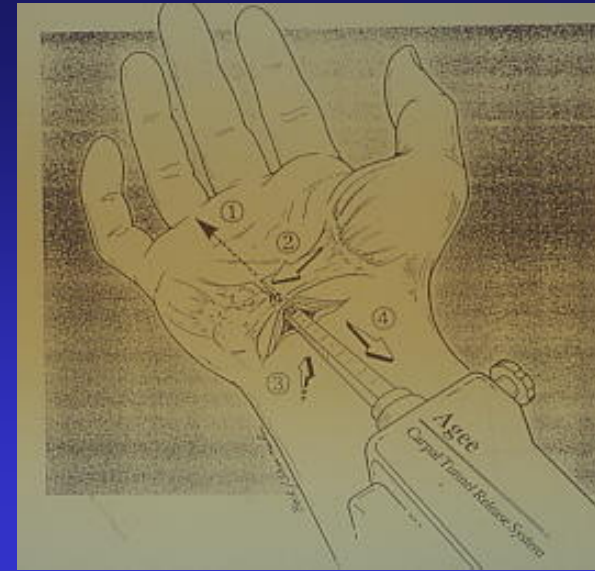
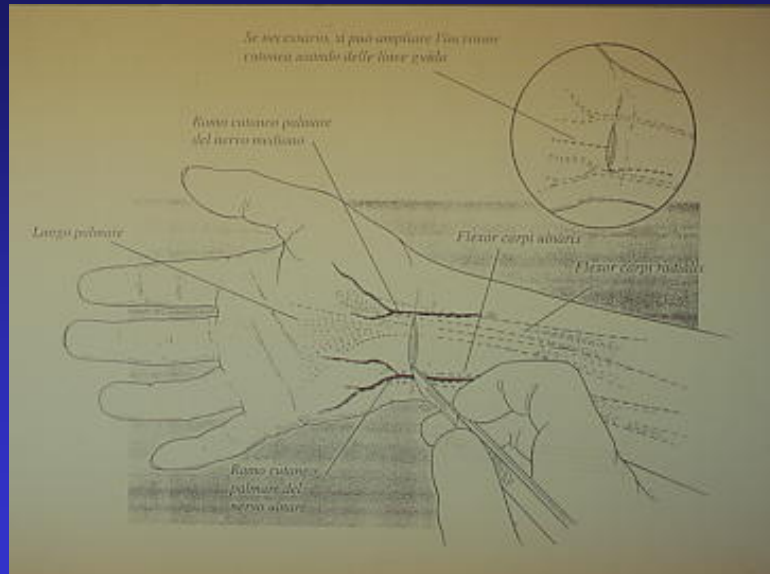
La distanza
media tra
retinacolo ed
arcata palmare
superficiale è di
6,1 mm

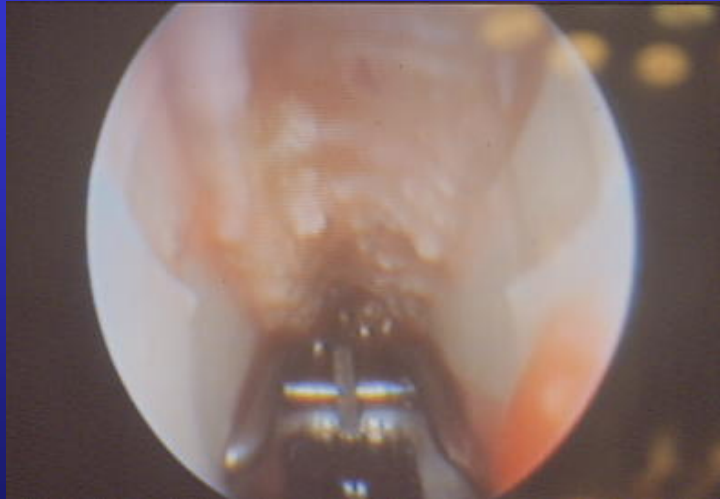
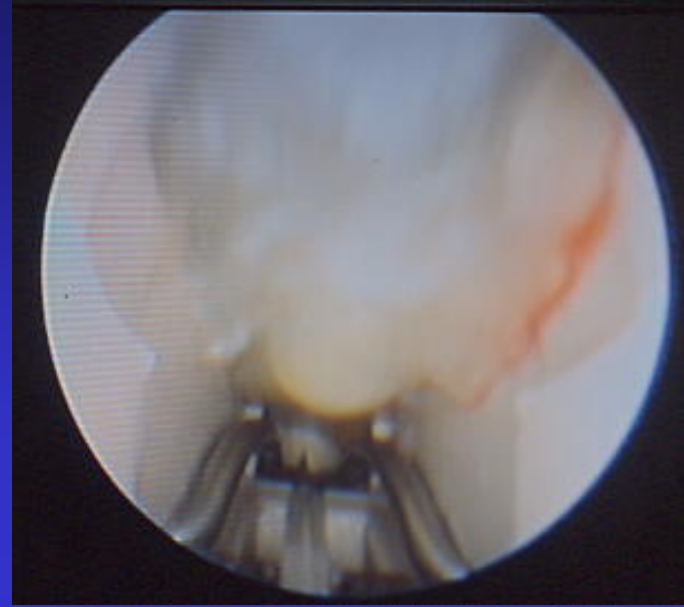
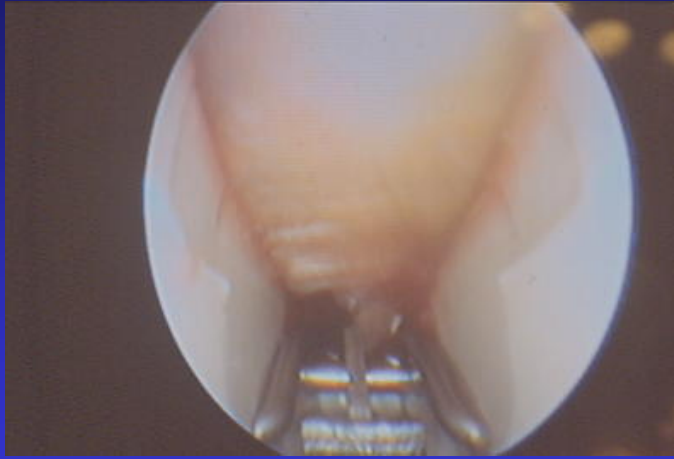


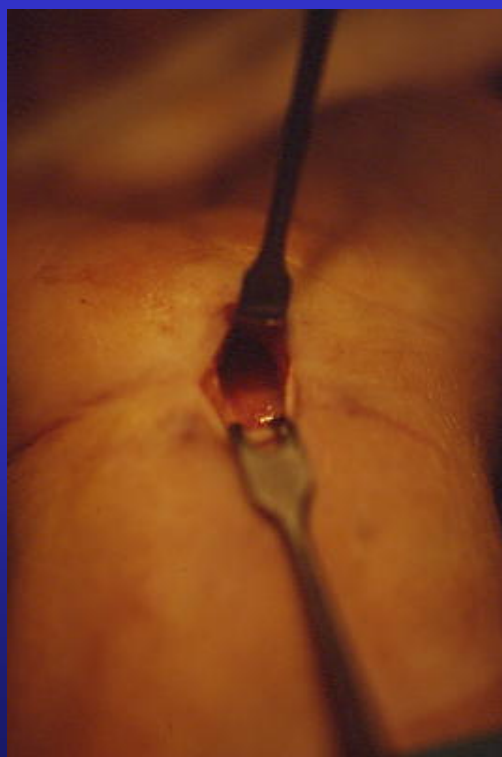
Metodica di Agee

Tecnica chirurgica









Dopo lunghi anni dove costantemente si
tessevano lodi della tecnica con più precoce
ritorno al lavoro, incisione migliore
cosmeticamente, scarsa incidenza di lesioni
iatrogene.....

Susan McKinnon (CAN)
non dimostrava nessun
miglioramento sostanziale
nella prognosi né nella
velocità di recupero delle
proprie attività
confrontando due gruppi
sostanziosi trattati a cielo
aperto e secondo Agee