Kompresivne neuropatije na gornjim ekstremitetima

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Definicija

- Oštećenja perifernih živaca na mjestima njihovog prolaska kroz anatomski uske koštano-vezivne i mišićno-vezivne kanale ili tunele.
- Kanalikularni ili tunelarni sindromi
- Anglosaksonskoj literaturi se upotrebljava termin *entrapment neuropathy*

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Uvod

- Dugotrajni pritisak dovodi do lokalne demijelinizacije, a potom i aksonalnog oštećenja živca.

- Najčešći uzroci: upalni procesi različite etiologije,
  posttraumatski procesi,
  ekspanzivni procesi ili
  različite anatomske varijacije.

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Uvod

- Kompresija nervus medianusa u zapešću
  sindrom karpalnog tunela

- Kompresija nervus ulnarisa u predjelu lakta
  sindrom kubitalnog tunela

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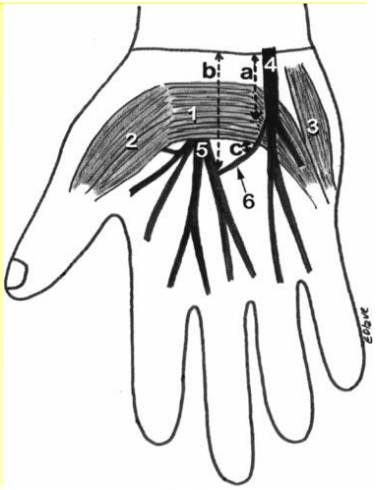
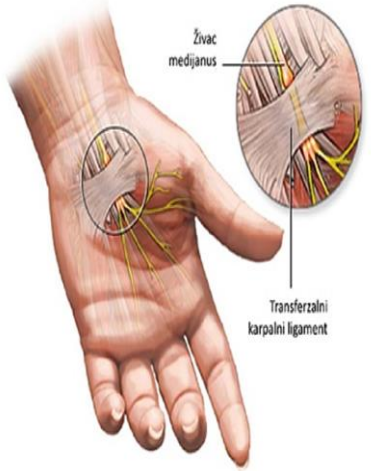
Sindrom karpalnog tunela

- Najčešća kompresivna neuropatija (90% svih KN)
- Pritisak na NM u karpalnom kanalu.
- Koštano-vezivni K - prednjoj strani korijena šake.
- Dno i dva zida – kosti zapešća
- Radijalna izbočina: tuberkulum ossis scaphoidei i tuberkulum ossis trapezii
- Ulnarnu: os pisiforme i hamulus osiss hamati
- Žlijeb sulcus carpi, koji transverzalni karpalni ligament pretvara u kanal.
- Tetive svih fleksora prstiju i NM





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Sindrom karpalnog tunela

- James Paget (1854) - kronična kompresija NM nakon starog prijeloma palčane kosti u visini tunela
- Marie i Foix (1913) patološko-anatomske uzroke
- Cannon i Love 1946 g prvi rad o 9 uspješnih op zahvata od strane Cannona i Lovea
- George Phalen ozbiljni javnozdravstveni problem

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Epidemiologija SKT

- Osobe srednje životne dobi, između 40. i 60. godine života.
- Ž 3x češće

- Prevalenca od 1-3%, pa čak i do 5%,
- Incidenca 50-150 slučajeva na 100.000 stanovnika.
- obostrani SKT oko 65%

- Broj dana bolovanja zbog SKT značajan - u prosjeku 27 dana
- SAD: godišnje oko pola miijuna dekompresija NM zbog SKT
- Troškovi za liječenje prosječno 30.000 USD

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Etiologija SKT

- primarni (prirodno uži KT) i sekundarni
- Sekundarni: spol, dob, dominantna ruka, nespecifični tendosinovitis, zadebljao lig carpi transversum, osteortritis, reumatski artritis, posttraumatski, trudnoća, DM, hipotireoza, fraktura/luksacija ručnog zgloba
- Metaanaliza (2002-2008g): Spol, dob, genetički i antropometrijski faktori (veličina KT) – najvažniji predisponirajući faktori rizika

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Etiologija SKT

- profesionalna zanimanja
  pijanisti,
  spremačice,
  daktilografi,
  informatičari,
  krojači,
  radnici –vibracione mašine

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Patogeneza SKT

- Vaskularna – intraneuralna ishemija NM uvjetovana kompresijom ili promjenama mikrocirkulacije
- Neurogena – lokalna demijelinizacija, potom aksonalna lezija usljed kompresije
- Obje teorije polaze od činjenice da je u SKT povišen intratunelarni pritisak.

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Patogeneza SKT

- Intratunelarni pritisak:
  prosječna vrijednost u zdravih osoba - 2 mmHg,
  osoba sa SKT - 32 mmHg.
- 20-30 mmHg remeti cirkulaciju u vasa nervorum NM,
- 30-60 mmHg remeti aksonalni transport,
- 60-80mmHg - potpuni prekid mikrocirkulacije i aksonalnog transporta

- Raste tokom ekstenzije i fleksije zgloba šake
- Često viđa prilikom rada na računalima više od 20 sati tjedno

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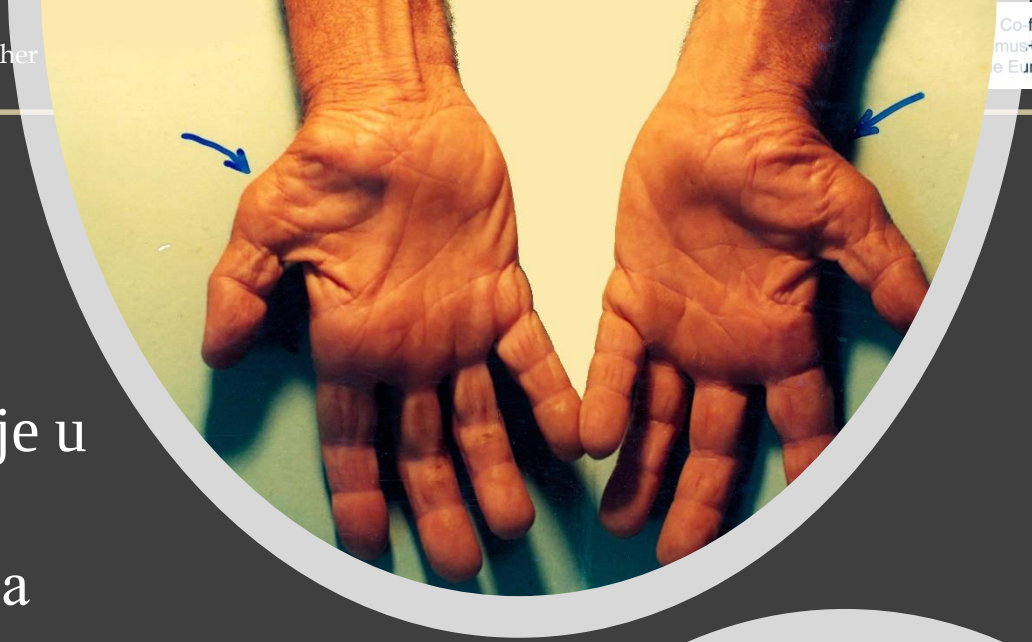

Klinička slika SKT

- bol, utrnulost i parestezije u inervacionoj zoni NM distalno od ručnog zgloba
- izraženiji noću i u jutarnjim satima
- atrofija mišića tenara u odmaklim slučajevima.
- osjećaj slabosti koji se pogoršava prilikom neke aktivnosti.
- iradirajuća bol koja se širi prema laktu i ramenu

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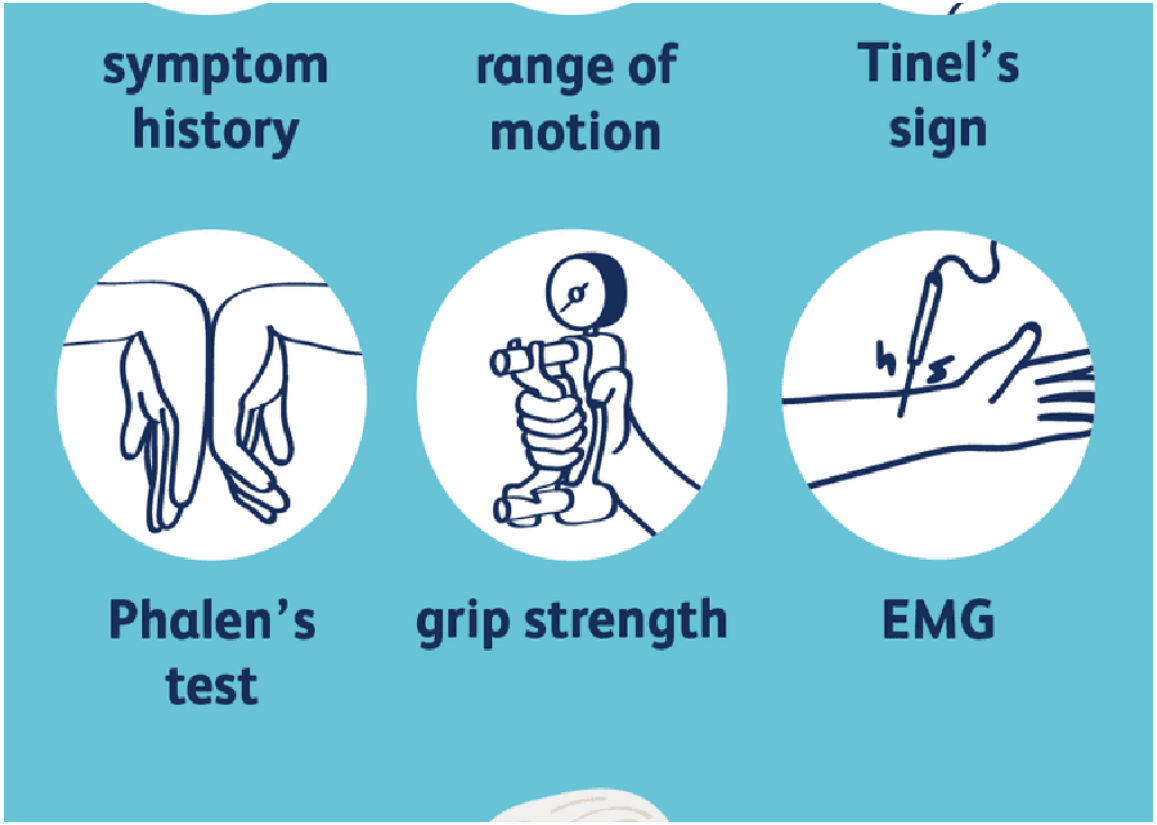
Dijagnoza SKT

- Anamneza
- Klinički pregled
- Elektromioneurografija
- Ultrazvuk NM
- MRI karpalnog tunela



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Dijagnoza: anamneza

- AAN (1993) vjerojatnost postojanja veća što je *anamnestički* veći broj standardnih simptoma i provocirajućih/olakšavajućih faktora.
- A. Simptomi: tupa bol u šaci, podlaktici ili nadlaktici, parestezije, slabost/nespretnost šake, suhoća kože, otok ili promjene boje kože, pojava bilo kojih od ovih simptoma u distribuciji NM;
- B. Provokacijski faktori: spavanje, dugotrajni položaj šake ili ruke, repetitivni pokreti ruke ili ručnog zgloba;
- C. Olakšavajući faktori: promjene posture ruke, „otresanje“ šakom.

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Dijagnoza: klinički pregled

- Opozicija palca (*m.opponens pollicis*) i volarna abdukcija *(m.abductor pollicis brevis*).
- Nemogućnost fleksije prva tri prsta - „šaka propovjednika“.
- Hipoestezija u području inervacionog područja NM na šaci.
- Osjetna inervacija tenara - ramus palmaris
- Ispad osjeta u području tenara nije karakteristična za SKT.

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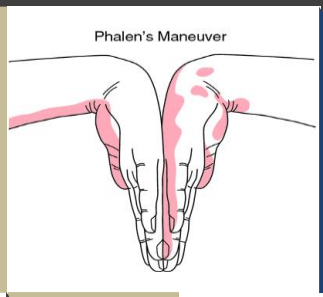

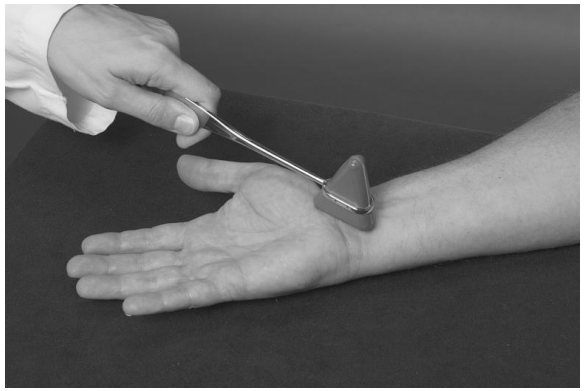

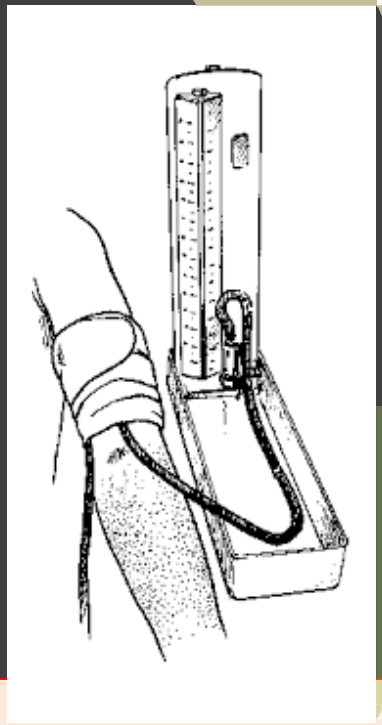

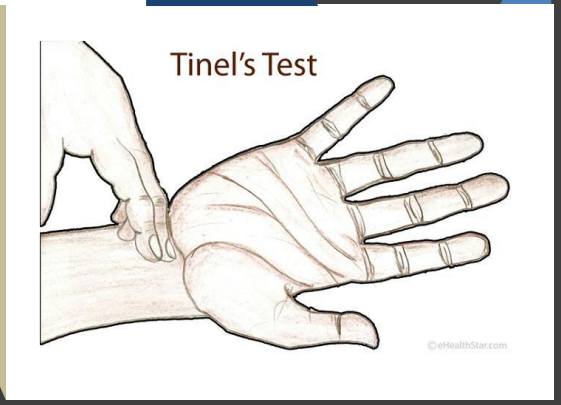

Dijagnoza: provokacijski testovi

Bilićev test
Phalenov test
Hoffman-Tinel test
Tourniquet test

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Dijagnoza: elektromioneurografija

- Zlatni standard u postavljanju dijagnoze SKT
- Mjerenje brzine provodljivosti impulsa duž segmenta živca
- Senzorička komponenta NM pogođena je mnogo ranije nego motorna komponenta
- U ranijim stadijima - usporeno senzoričko provođenje impulsa.
- Mjerenje motoričke provodljivosti - površinske elektrode u području od lakta do zgloba šake.
- Dokazujemo usporeno provođenje impulsa - rezultat demijelinizacije.
- Isključiti/potvrditi: cervikalne radikulopatije, polineuropatije i drugih kompresivnih sindroma.
- 13-27% bolesnika rezultati uredan EMNG nalaz

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UZ pregled n.medianusa

- UZ u dijagnostici CTS
- Senzitivnost 70-88%
- Specifičnost 57-97%

- CSA (veće od 0,10 cm2)

- Omjer zapešće-podlaktica (veće od 1,8 povećava Senzitivnost na 100%)

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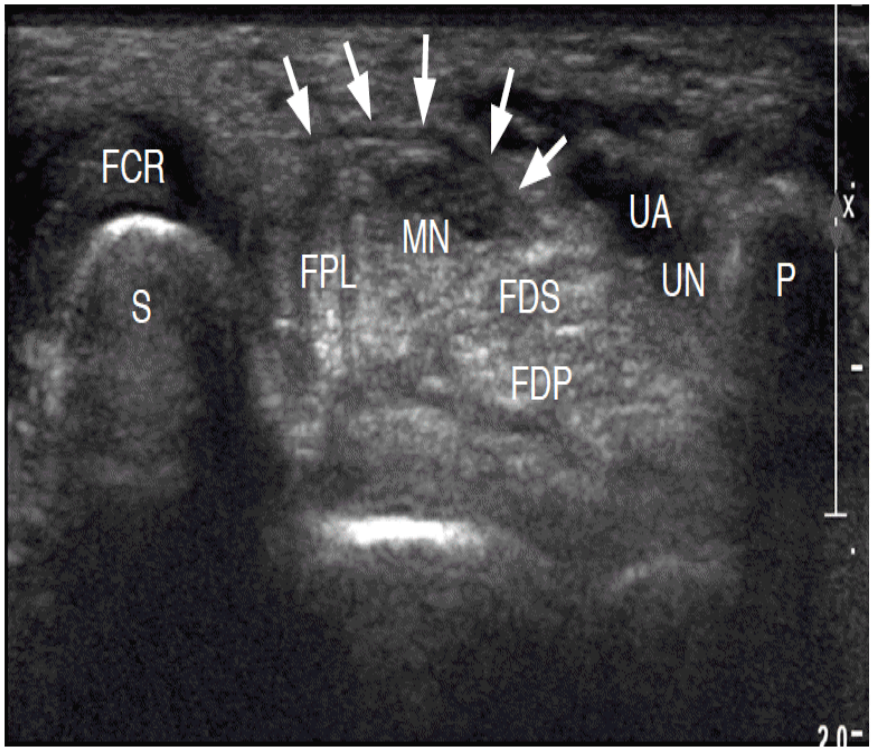
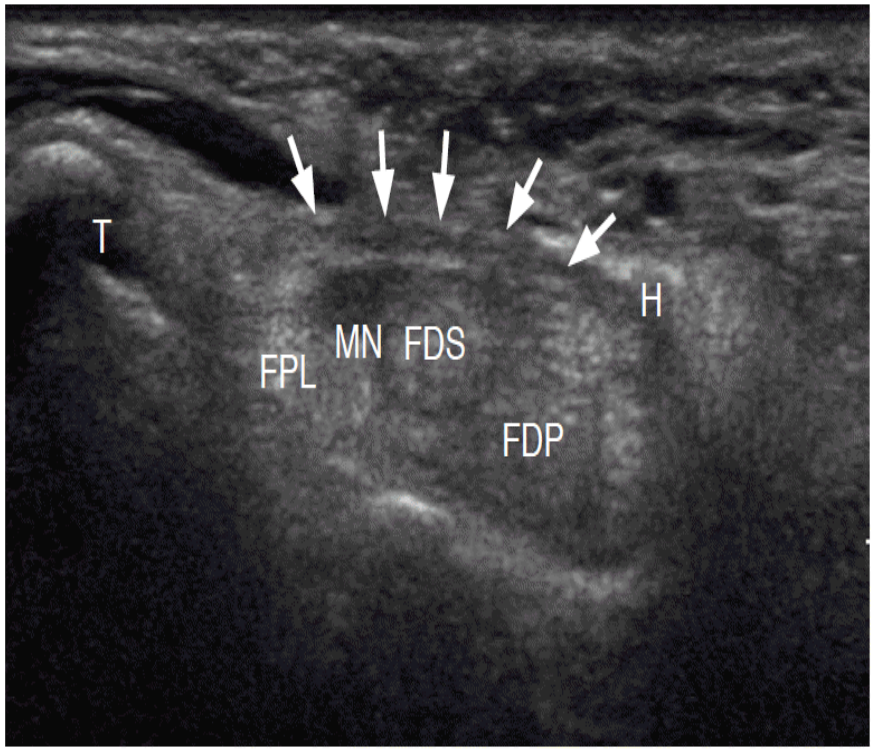
N.medianus - zapešće



A



B

A. NM (S i P orijentiri)) u proksimalnom dijelu karpalnog tunela;
B. NM (T i H orijentiri) u distalnom dijelu karpalnog tunela

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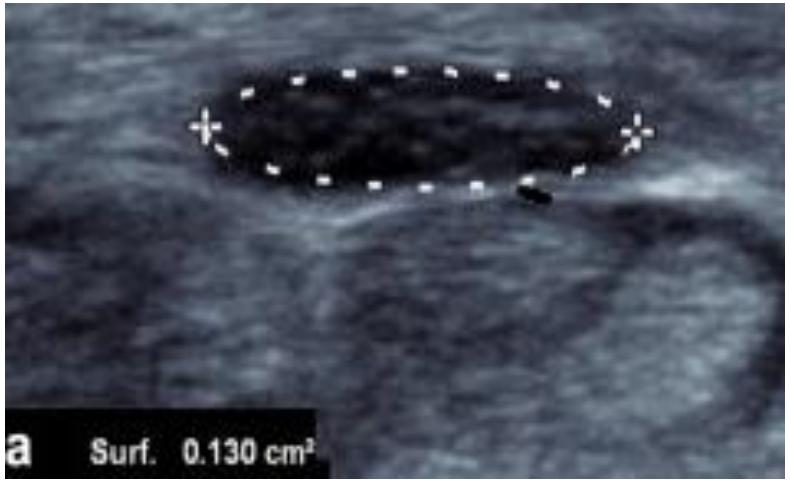
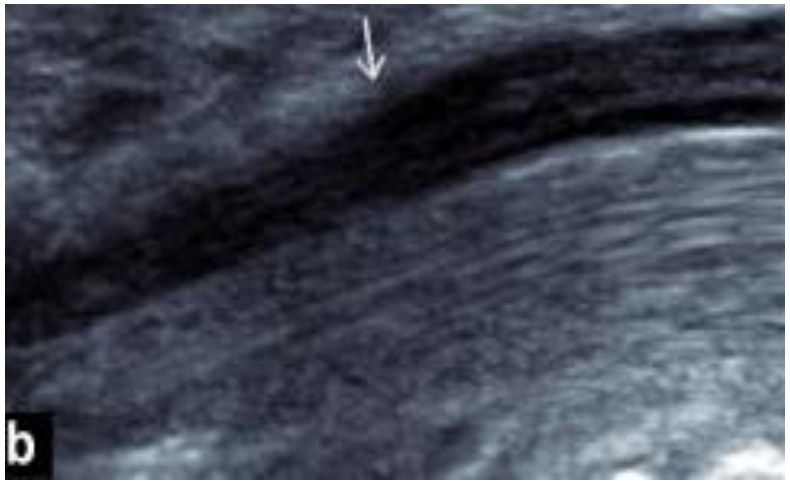
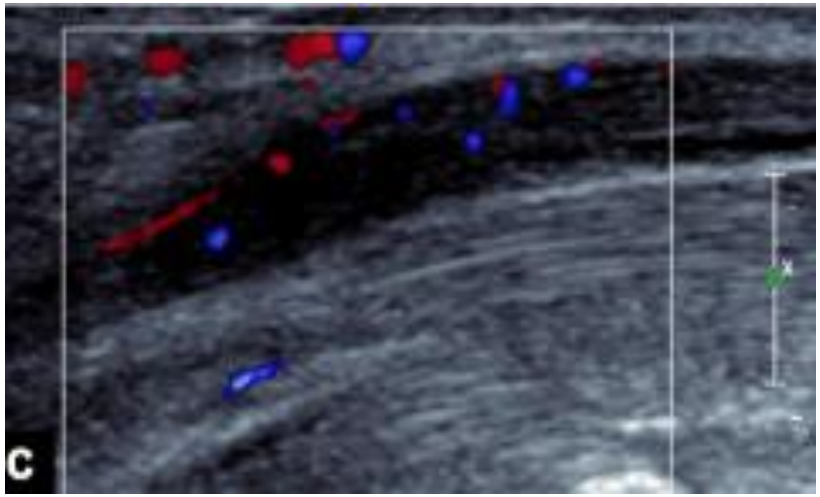
Ultrazvuk - KTS



37g, Ž, krojačica
a. CSA 13,0 mm2
b. Uzdužni presjek
c. Intraneuralna hiperemija





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Dijagnoza: MR pretraga

- vizualni prikaz živca u KT
- ograničena radi cijene i dužine trajanja pretrage.
- dodatna dg pretraga kod atipičnih slučajeva, kod bolesnika sa sumnjom na recidiv nakon kirurškog liječenja.
- Unatoč adekvatnoj kirurškoj dekompresiji kod manjeg broja bolesnika simptomatika i dalje perzistira.
- možemo dokazati da je dekompresija živca uspješno obavljena, te tako izbjeći potencijalno mogući ponovni operativni zahvat.

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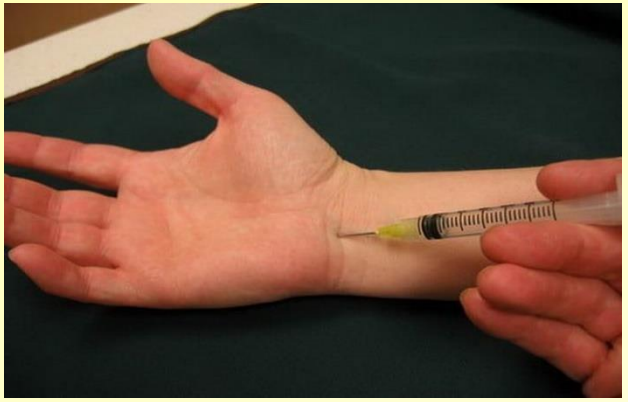
Konzervativno liječenje

- Prevencija (edukacija o poštedi zahvaćene ruke)
- Noćno korištenje udlaga
- Terapija laserom, akupunktura
- Lokalna primjena kortikosteroida sa ciljem smanjenja edema uz upotrebu UZ



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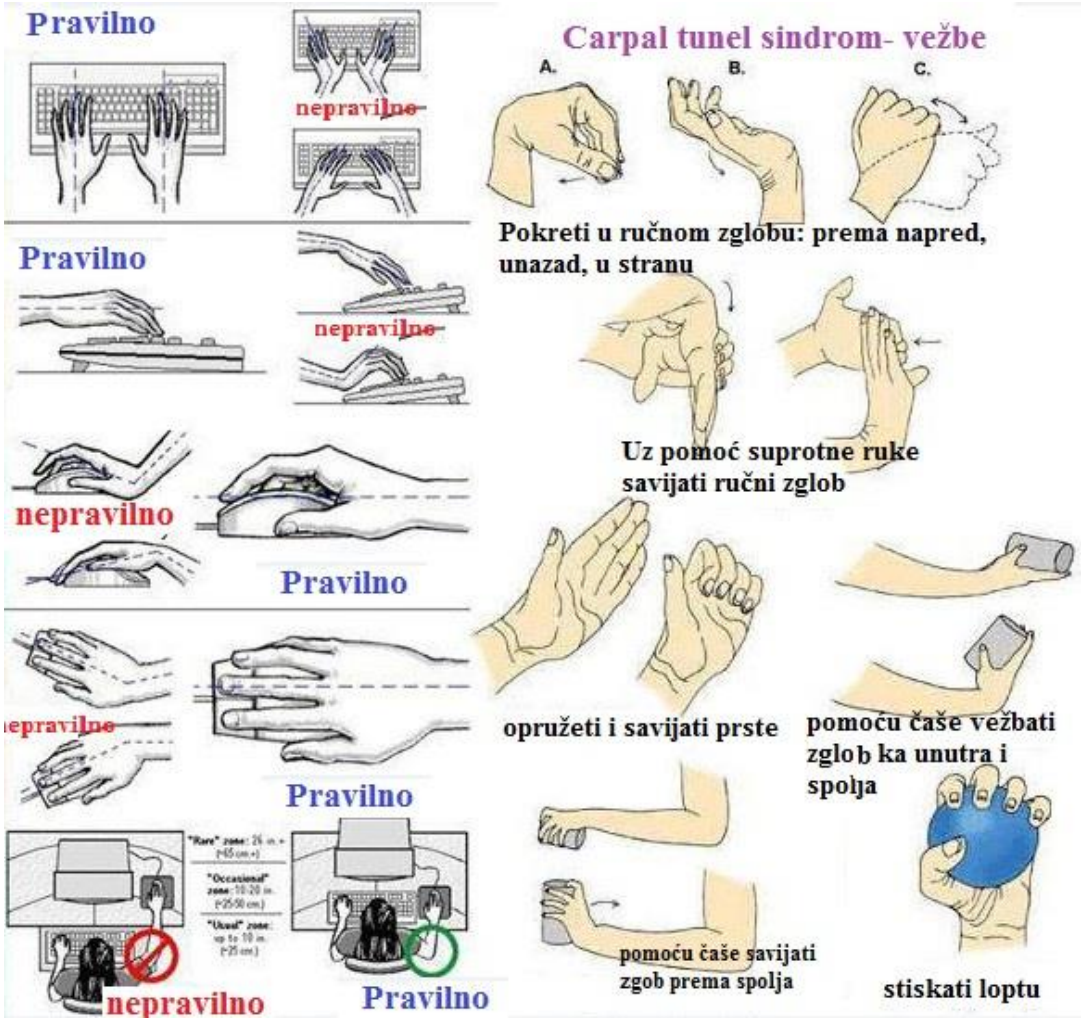
Konzervativna terapija



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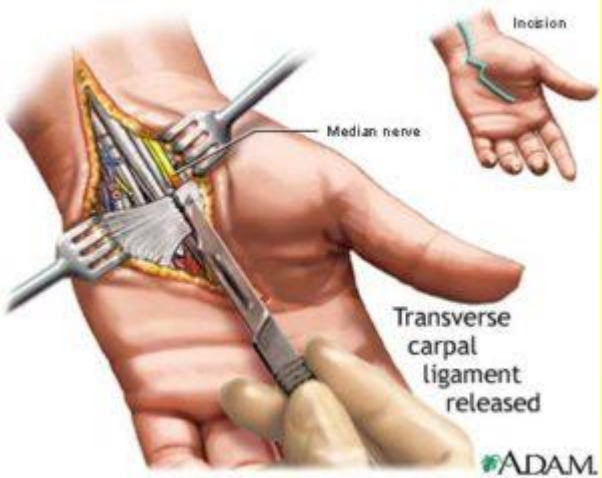
Operativno liječenje

- Tradicionalna „otvorena“ (duži rez da se prikaže lig)
- Kratki rez – minimalno invazivni pristup (komp KRBS)
- Endoskopski pristup (skuplji, povećan rizik za oštećenje NM, smanjuje postop oporavak, manje komp vezano za ožiljak)



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Sindrom kubitalnog tunela

- druga najčešća kompresivnih neuropatija u kliničkoj praksi
- prvi put opisao je Osborne 1957 godine
- Feindel i Stratford su godinu dana kasnije uveli pojam «lakatni tunel»
- 4 anatomska mjesta kompresije NU u predjelu lakta (epikondilarni žlijeb (RTC); ME nadlakatne kosti; medijalni intermuskularni septum (HUA); kubitalni kanal)

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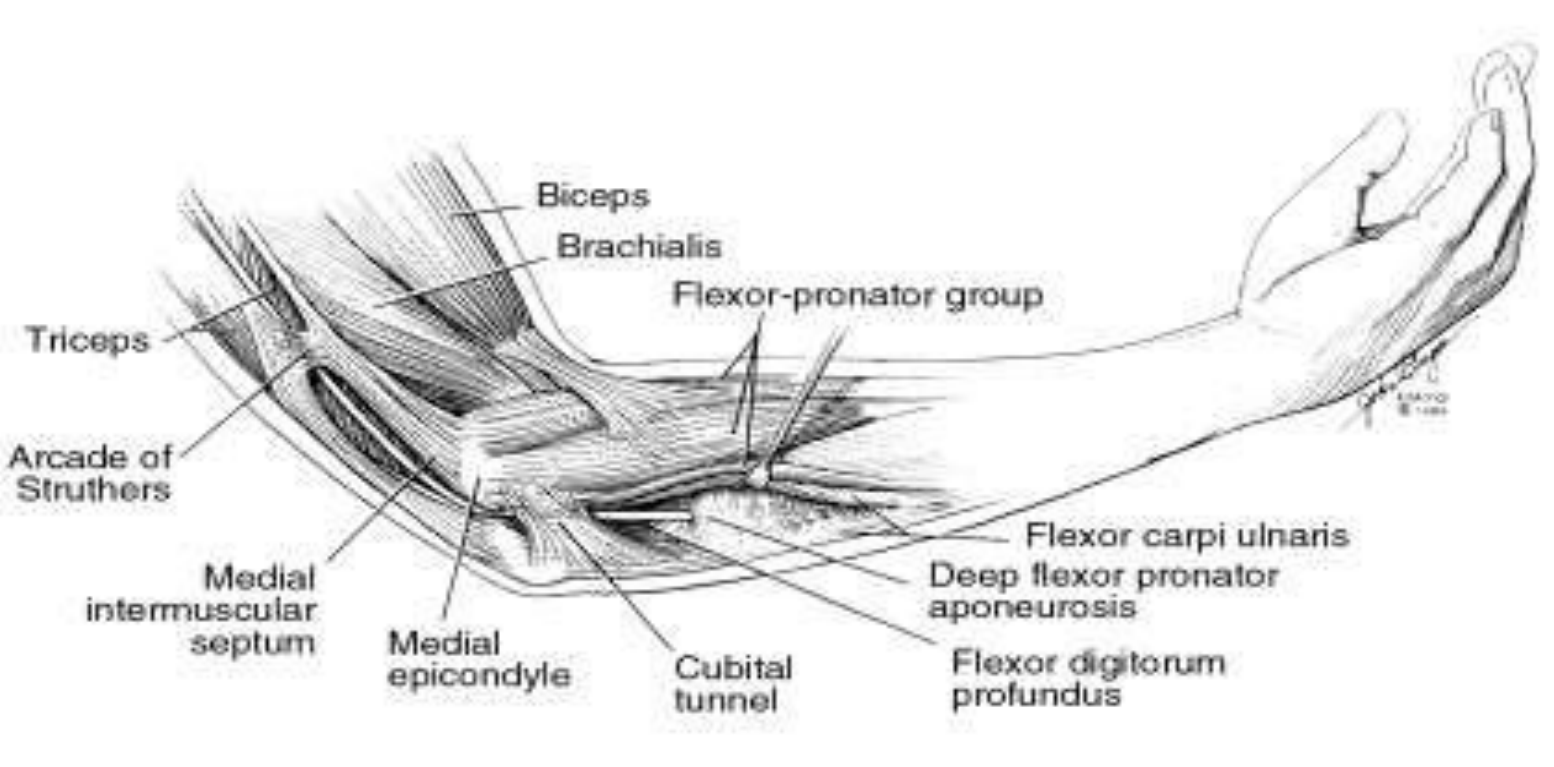
Sindrom kubitalnog tunela

ulnarna i humeralna glava m.flexor carpi ulnaris



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Epidemiologija

- Incidenca 25/100 000 ljudi godišnje
- M 3-8 x češće
- osobe koje tokom rada drže lakat u fleksiji (držanje mobilnih telefona, sušila za kosu, udarne bušilice, vozači kamiona)
- ponavljajuće pokrete fleksije i ekstenzije u laktu (čistači podova, sport: tenis, golf, bacači lopte u bejzbolu)
- Trauma, DM, deformacije lakarnog zgloba, suprakondilarni prijelomi nadlakatne kosti, hipermobilnost živca (20% populacije)

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Etiologija i patogeneza UNE

- Pri ekstenziji lakta poprečni presjek kanala – ovalan; fleksiji - elipsoidan
- smanjuje mu se promjer za oko 50%, što rezultira porastom intraneuralnog pritiska od 7 do 50 mmHg.
- Prilikom fleksije NU se dodatno isteže 5-8 mm.
- Prosječan pritisak u kanalu kod bolesnika mjeren intraoperativno iznosi oko 105 mmHg (normalno 17-65 mmHg)

Beekman et al, 2004 & 2009

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Etiologija i patogeneza UNE

- Istraživanja – u KK intraneuralni i ekstraneuralni pritisci najniži pri fleksiji od 45 stepeni (optimalno za imobilizaciju)

- Kombinacija abdukcije u ramenu, fleksije u laktu i ekstenzije u ručnom zglobu dovode do najvećeg porasta pritiska u KK, čak 6x, a nerv se isteže za 4,7 mm.

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Etiologija i patogeneza UNE

- 2 patogenetska mehanizma: kompresija i trakcija
- HUA: vezane za posao, dominantna ruka kod starijih osoba koje obavljaju teške fizičke poslove
- RTC: vanjska kompresija na NU kod nedominantne ruke i to uglavnom oslanjanje na ruku (stol, ležanje)

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Simptomi UNE

- Početak: senzorni simptomi – mravinjanja i osjećaj žarenja – u anatomskoj distribuciji NU
- Tipično: manje BOLNO (za razliku od KTS)
- ozbiljniji znaci kompresije: motorni simptomi sa slabošću malih mišića šake i gubitkom snage
- Wartenbergov znak: zbog slabosti introsealnih mišića pacijent ne može primaknuti mali prst prstenjaku i ostalim prstima, ne može ugurati ruku u džep

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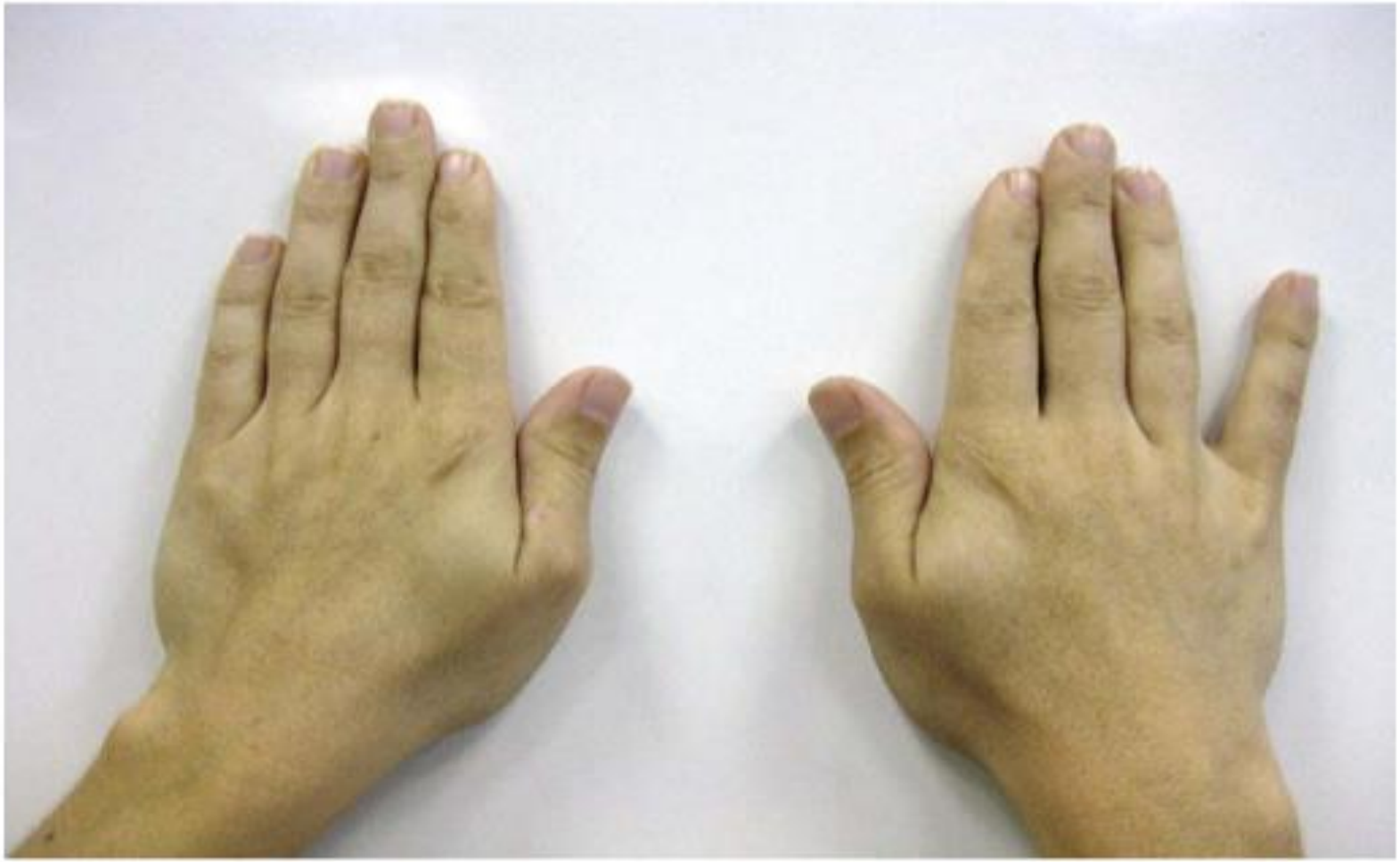
Wartenbergov znak na desnoj ruci



Slika iz: J hand ther. 2009; 22:209–20

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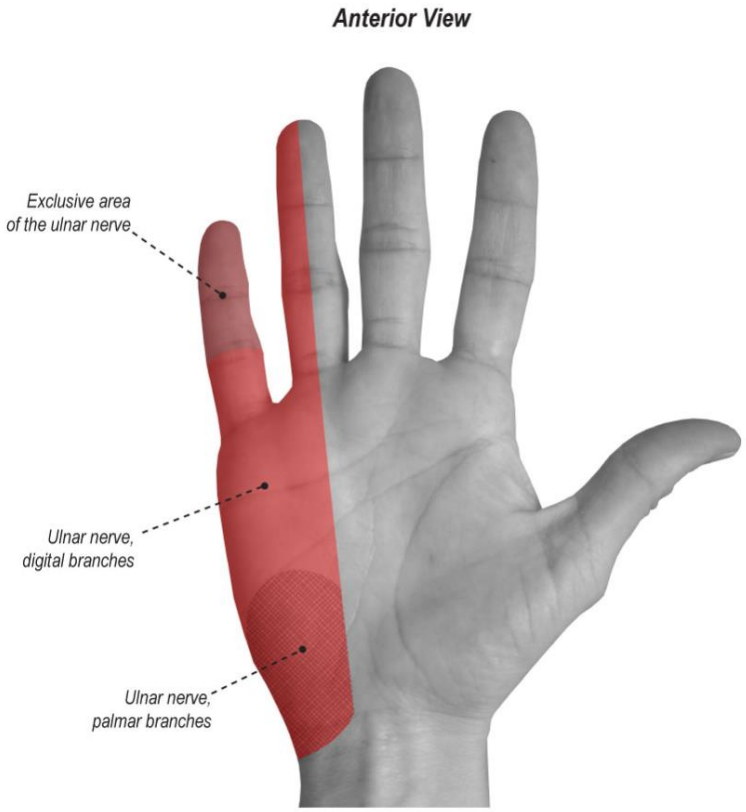
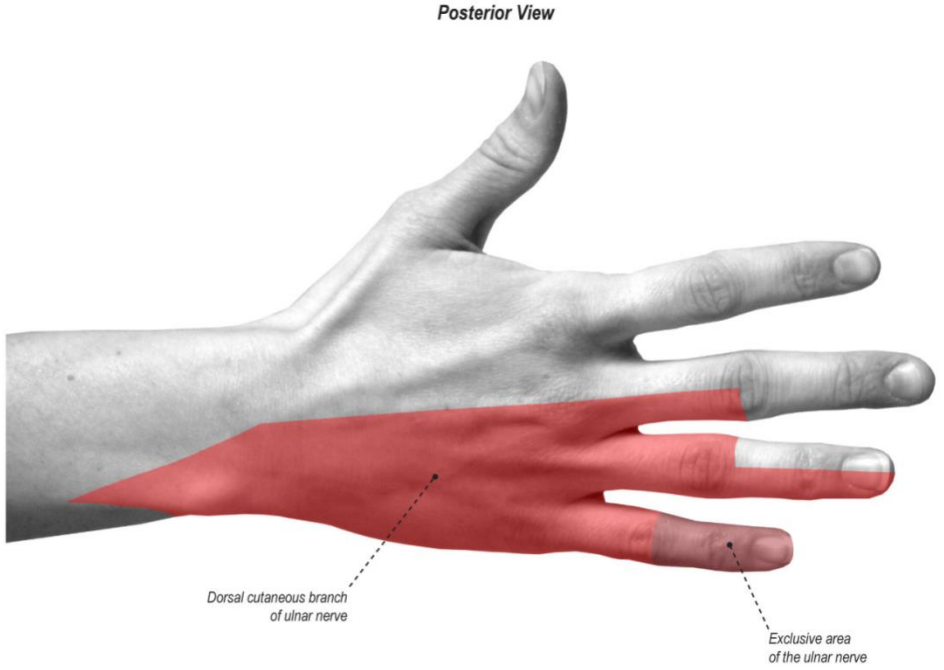
UNE: senzorni simptomi





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Motorni simptomi UNE

Oko 50% pacijenata ima slabost u mišićima:

- Dorzalni interosealni & lumbrikalni (3 & 4)
- M. flexor pollicis brevis
- M. abductor digiti minimi / quinti

Moguću slabost:

- M.flexor digitorum prof (4&5 prst)-30%
- M.flexor carpi ulnaris – u 10-20%

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UNE neurološki pregled

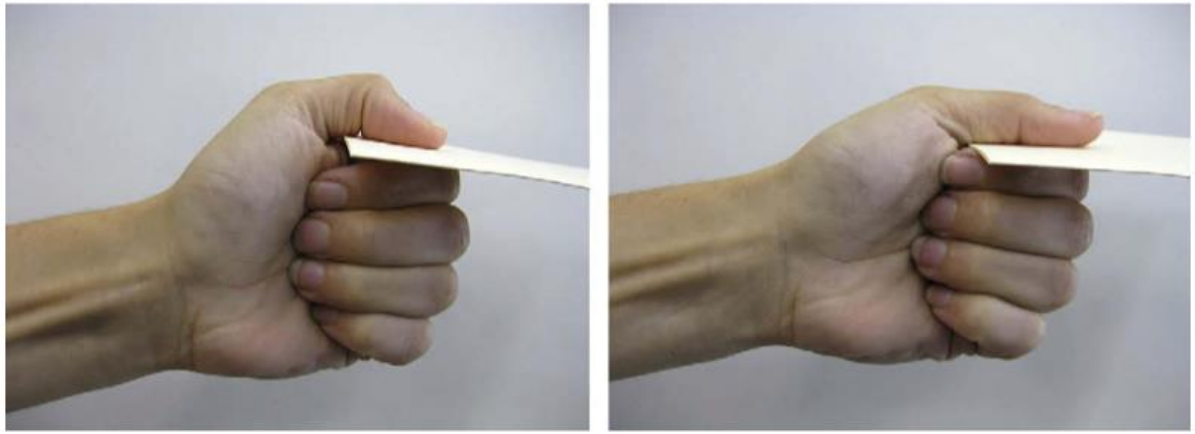

FIGURE 4. *Positive Froment's sign on the left, negative Froment's sign on the right. It is recommended that the wrist be positioned in slight flexion when performing this test.*

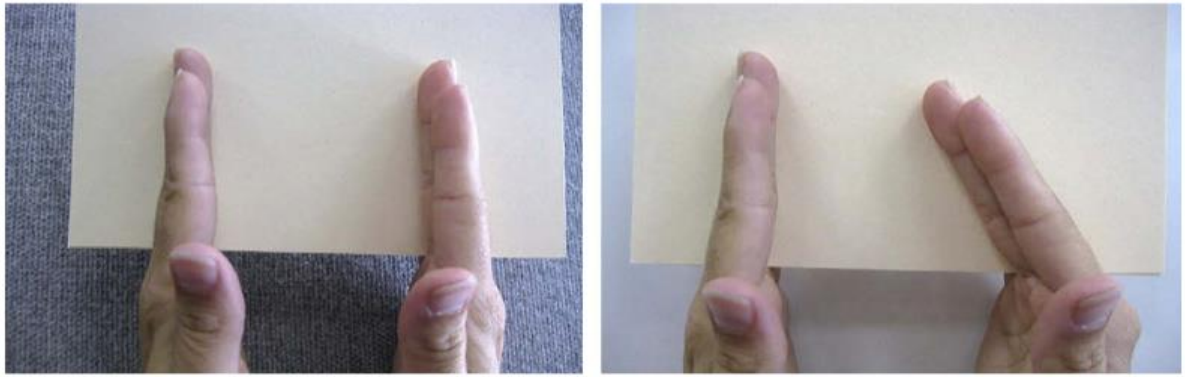

FIGURE 5. *A positive finger flexion sign is present in the right hand on the right photo. The left photo shows a negative finger flexion sign as the paper is pulled distally.*

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UNE neurološki pregled

FIGURE 6. *Crossed finger test. The left hand shows a positive crossed finger test as the index finger is unable to completely cross over the middle finger. The right hand shows a negative crossed finger test.*

FIGURE 7. *Testing for Egawa's sign. Patient first flexes the metacarpophalangeal joint and then abducts the finger in both directions. Because this maneuver can be difficult to perform, comparison with the uninvolved side is strongly recommended.*

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The Patient-Rated Ulnar Nerve Evaluation (PRUNE)

PATIENT RATED ULNAR NERVE EVALUATION

Name:_____ Date:_____

*The questions below will help us to understand the amount of pain or difficulty you experience because of your hand/arm. Please describe your **average** experience **over the past week.***

RATE YOUR **PAIN**:	***0=No Pain***										***10 = Worst Possible***
When it is at its worst	0	1	2	3	4	5	6	7	8	9	10
At rest	0	1	2	3	4	5	6	7	8	9	10
In the morning	0	1	2	3	4	5	6	7	8	9	10
After work/activity	0	1	2	3	4	5	6	7	8	9	10
At night (when sleeping)	0	1	2	3	4	5	6	7	8	9	10
How often do you have pain?	**Never**	**0**	1	2	3	4	5	6	7	8	9	**10**	**Always**
RATE YOUR **OTHER SYMPTOMS:**	***0= None***										***10= Worst Possible***
Numbness in my little(5th) finger	0	1	2	3	4	5	6	7	8	9	10
"Pins and needles" in my little finger	0	1	2	3	4	5	6	7	8	9	10
Unable to control the position/movement of my little finger	0	1	2	3	4	5	6	7	8	9	10
Weakness in my hand (pinch/grip)	0	1	2	3	4	5	6	7	8	9	10

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RATE YOUR **DIFFICULTY** **Performing These Activities**	***0= No difficulty***										***10= Completely unable***
Eat (use fork, knife, or chopsticks)	0	1	2	3	4	5	6	7	8	9	10
Lift a heavy object	0	1	2	3	4	5	6	7	8	9	10
Hold an object (a tool, book, phone or electronic device) for 1 hour	0	1	2	3	4	5	6	7	8	9	10
Repeated reaching	0	1	2	3	4	5	6	7	8	9	10
Tasks with repetitive finger use –like typing, playing musical instruments or handling small objects	0	1	2	3	4	5	6	7	8	9	10
Turn a key/doorknob/handle	0	1	2	3	4	5	6	7	8	9	10
Usual Activities- Rate your difficulty doing the ***usual*** *activities that you did* ***before*** *your hand/arm problem started.* **0** *means you have* ***no difficulty*** *with ANY of your usual activities; and* ***10*** *means you are* ***completely unable*** *to ANY of your usual activities.*	***0= No difficulty***										***10= Completely unable***
Personal care activities (like washing, dressing)	0	1	2	3	4	5	6	7	8	9	10
Household (cleaning, maintenance)	0	1	2	3	4	5	6	7	8	9	10
Work (your job or everyday work)	0	1	2	3	4	5	6	7	8	9	10
Recreational activities	0	1	2	3	4	5	6	7	8	9	10

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Elektrodijagnostičke metode u UNE

- podrazumijevaju ispitivanje brzine provodljivosti senzornih i motornih impulsa te elektromiografiju
- Na kompresiju NU upućuje apsolutno ili relativno smanjenje brzine motorne provodljivosti
- plurisegmentna analiza ulnarnog nerva

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Ultrazvuk kod UNE

- značajan za dinamičko praćenje kompresivnih neuropatija
- pruža mogućnost identificiranja edema NU proksimalno od mjesta kompresije
- Anatomski odnos sa okolnim strukturama
- određivanje precizne lokacije kompresije, a samim tim i terapijskog pristupa
- CSA ME 7.6 mm2, podlaktice 5.2 mm2, nadlaktice 6.3 mm2

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Položaj sonde

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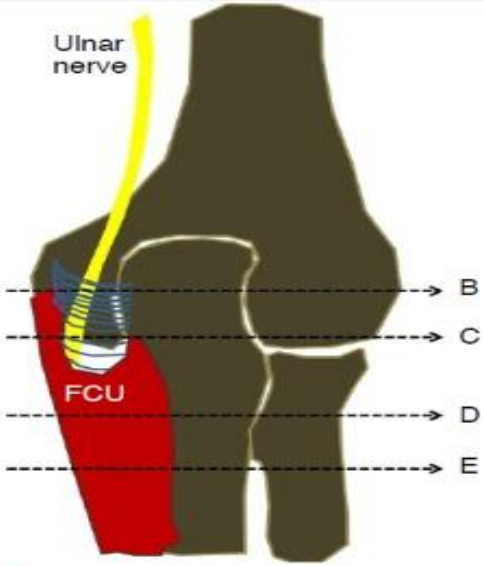
Transverzalni sonogrami NU



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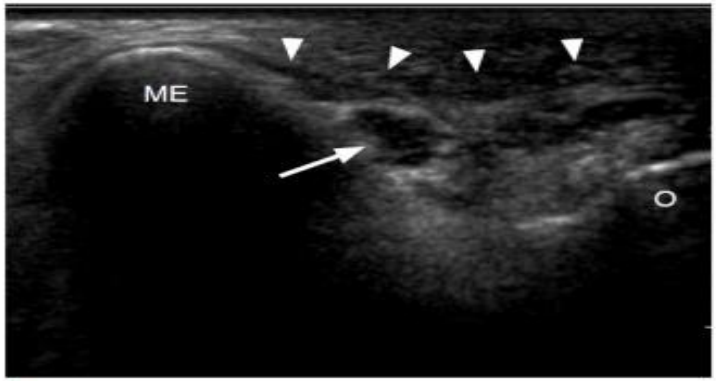

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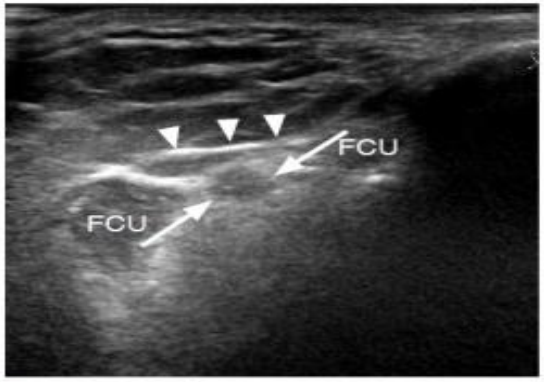

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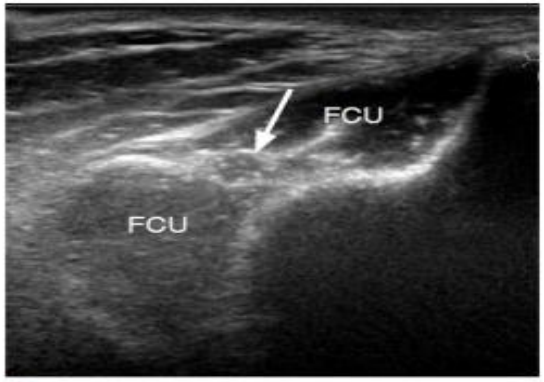

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E

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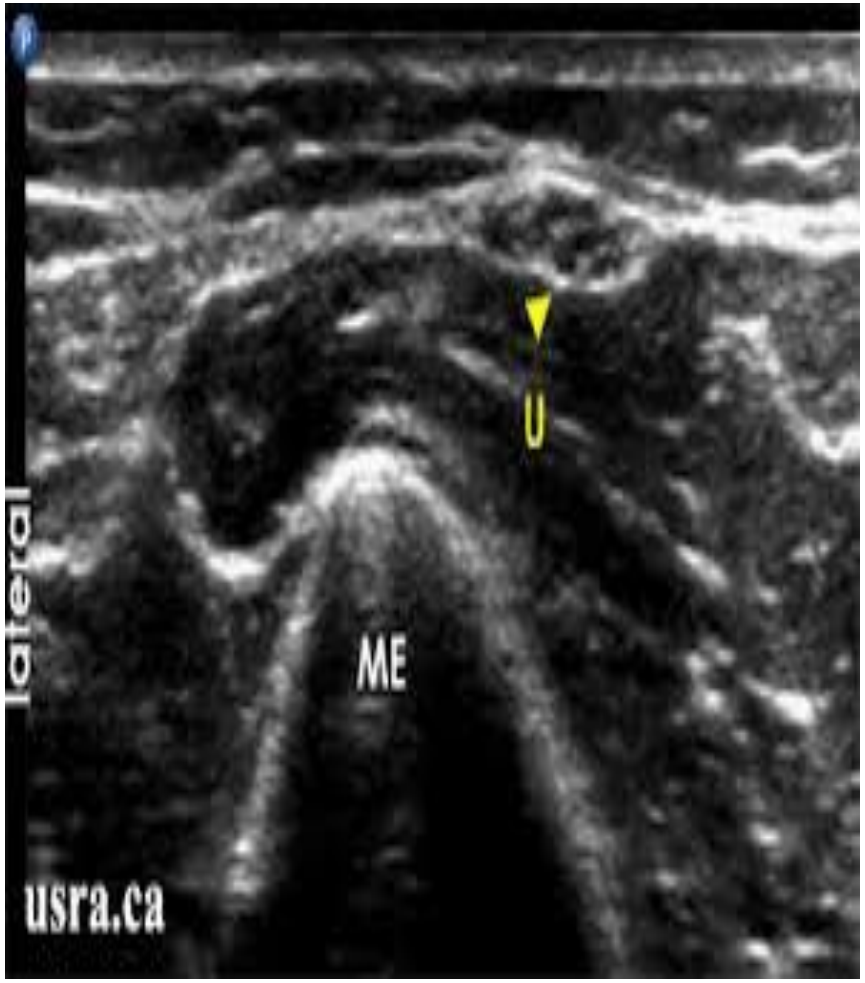
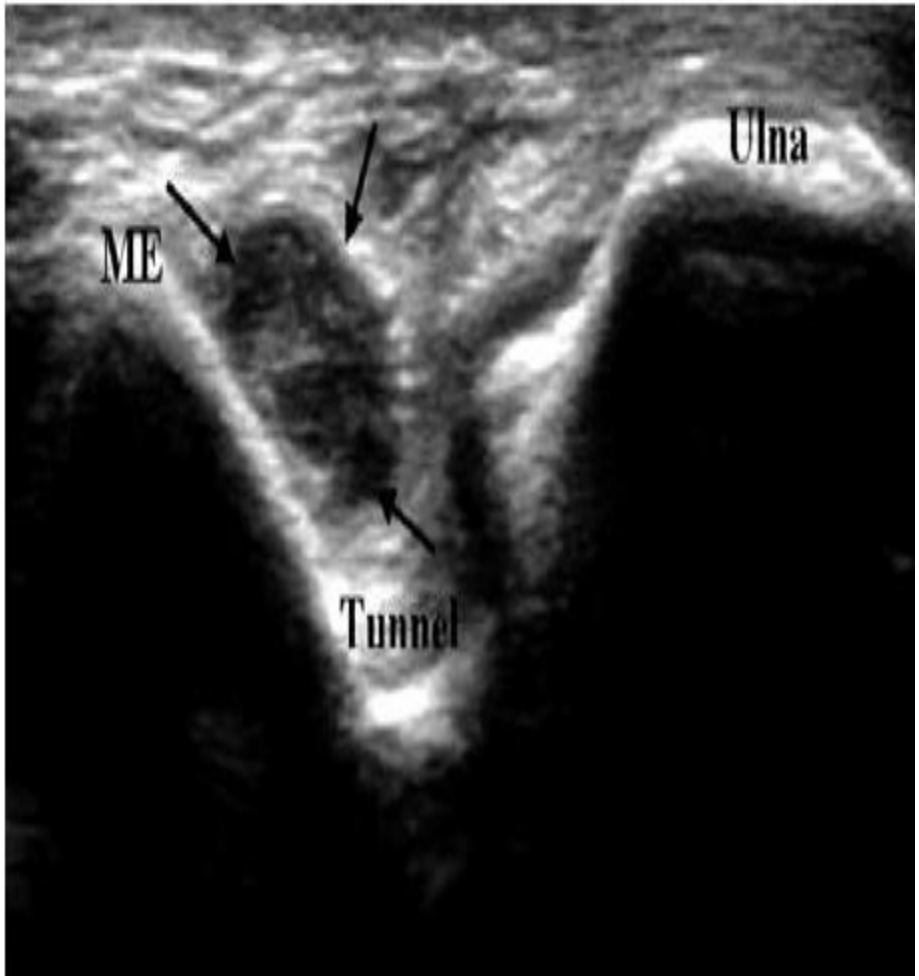
Sonogrami NU





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UNE : “Pronaći pravu lokalizaciju”

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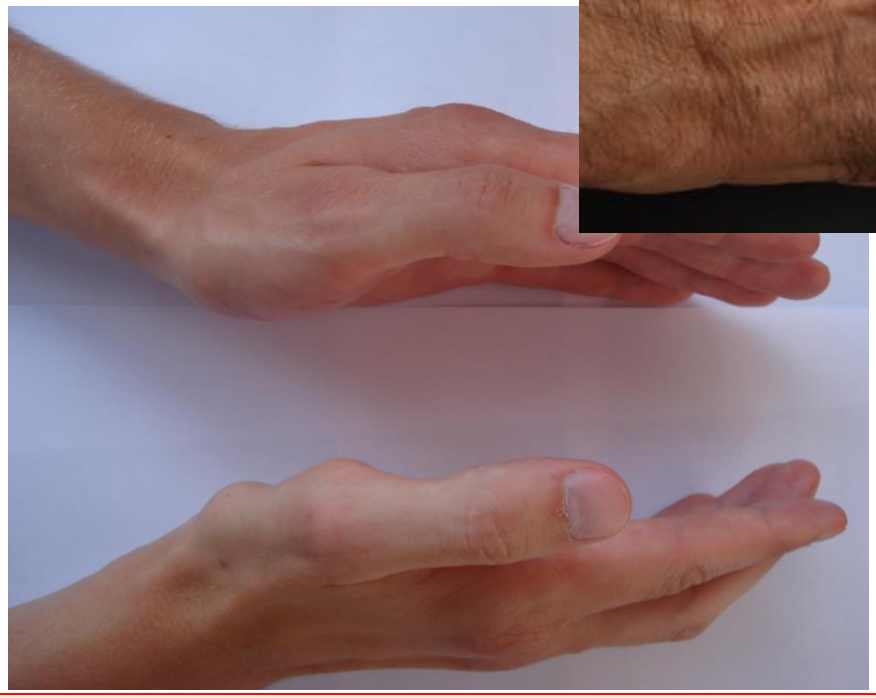
Neurogenic TOS vs. UNE vs. CTS



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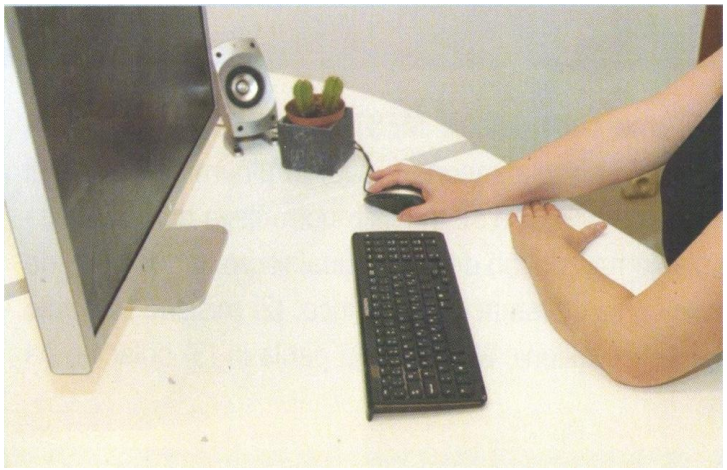
Liječenje

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Liječenje – operativni zahvat

- Kronično oštećenje NU, posebno kasne pareze mišića nakon traume lakatnog zgloba, apsolutna su indikacija za dekompresiju živca.
- Ustanove teške promjene živca i njegove adhezije, neurinomi ili strikture, a da se preoperativno palpacijom nisu našle bitne promjene.
- Koristan i kada simptomi traju duže od jednu do dvije godine.
- U 70 do 80% operisanih nastupa znatno smanjenje bolova i parestezija, a u 50% bolesnika nastupi i potpuni oporavak.

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UNE: the Papal benediction sign

Fig. 1. Jesus and his Apostles Fresco from St. Domitilla Catacombs 2nd to 4th C. Rome. (notice hand of Peter in black outline).

Clin Anat. 2015 Jun 28. Analysis of the Papal Benediction Sign: The ulnar neuropathy of St. Peter.

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Papal benediction sign = UNE claw hand

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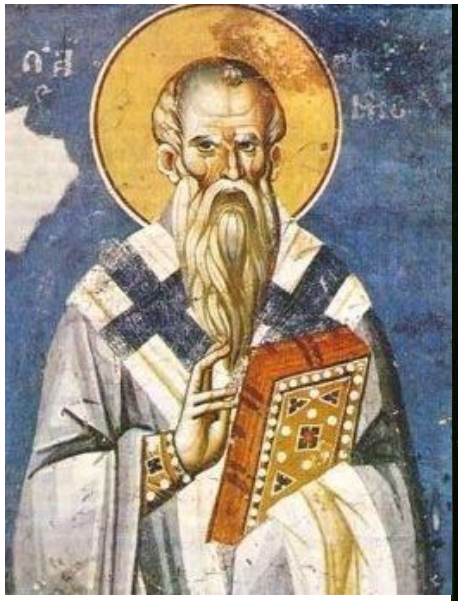
Clin Anat. 2015 Jun 28.

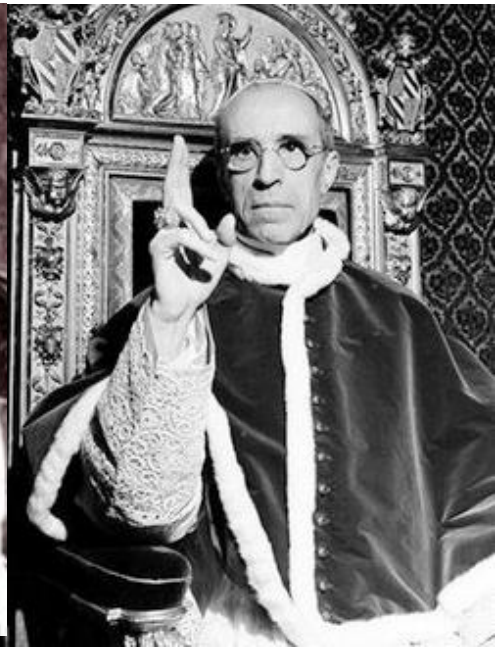
Quiz: who's getting it right?



Clement I
92-99 AD

Adrian VI
1459–1523

Pius X
1835-1914



Pius XII
1876 – 1958

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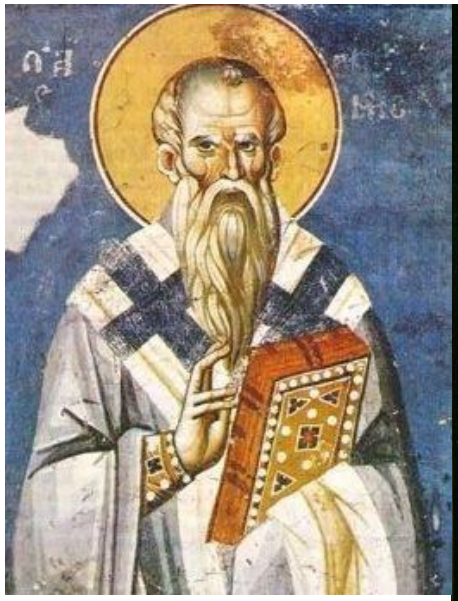


Clement I
92-99 AD

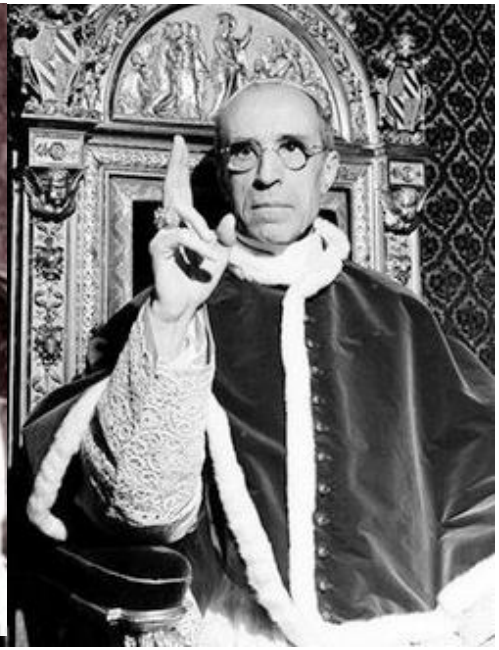
WRONG

Adrian VI
1459–1523

RIGHT

Pius X
1835-1914

WRONG



Pius XII
1876 – 1958

RIGHT

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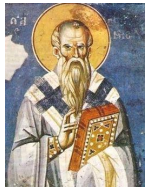





Clement I
92-99 AD

WRONG

Adrian VI
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RIGHT

Pius X
1835-1914

WRONG

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