

BIOMECANICA DE LA MANO



FUNCIONES

LA MANO ES EL CEREBRO EXTERNO DEL HOMBRE

CONOCIMIENTO TRIDIMENSIONAL

MANIPULACION CON PRECISION Y ECONOMIA

COMPLEJIDAD NEUROLÓGICA

➤ **IMPORTANTE ÁREA DE REPRESENTACION CORTICAL**

➤ **MEDULAR:**

ENGROSAMIENTOS (C5-D1)

MÁS NÚCLEOS MOTORES

TODOS LOS NIVELES DEL PLEXO BRAQUIAL

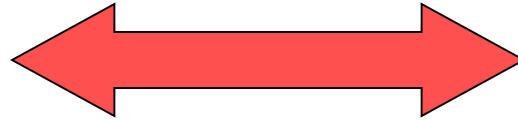
INERVADO POR LOS 3 TRONCOS PRINCIPALES

➤ **ELEVADA CANTIDAD DE RECEPTORES SENSITIVOS**

“La mano como órgano inteligente”

COMPLEJIDAD BIOMECANICA Y NEUROLOGICA

ESTRUCTURA



FUNCION

CONDICIONES MECÁNICAS NORMALES

- ✓ RANGO NORMAL DE MOVIMIENTO ARTICULAR
- ✓ EFECTO TENODÉSICO CIRCUITOS DIGITALES
- ✓ ISOMETRÍA
- ✓ NORMAL DESLIZAMIENTO DE LOS TENDONES
- ✓ BALANCE DE FUERZAS ESTABILIZADORAS
- ✓ COORDINACION NEUROMUSCULAR Y DEL SISTEMA RETINACULAR

BIOMECANICA

3 COLUMNAS OSEAS

CARPO- METACARPO- FALANGICAS

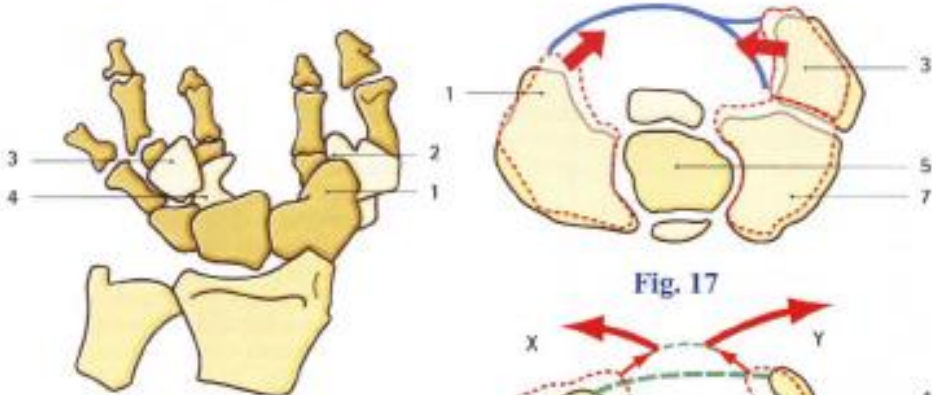


Fig. 16

Fig. 17

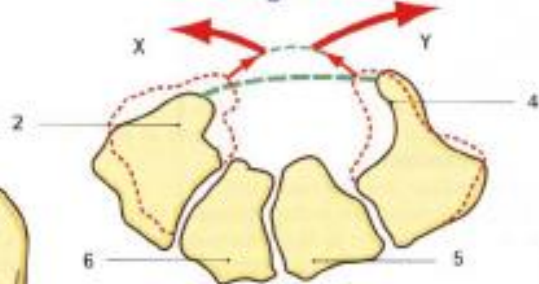


Fig. 18

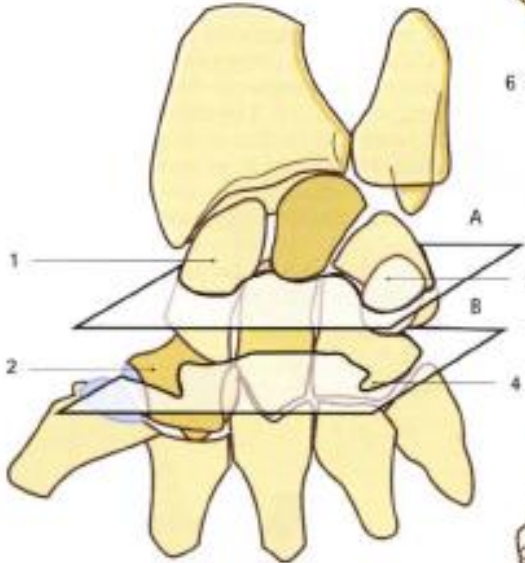


Fig. 19

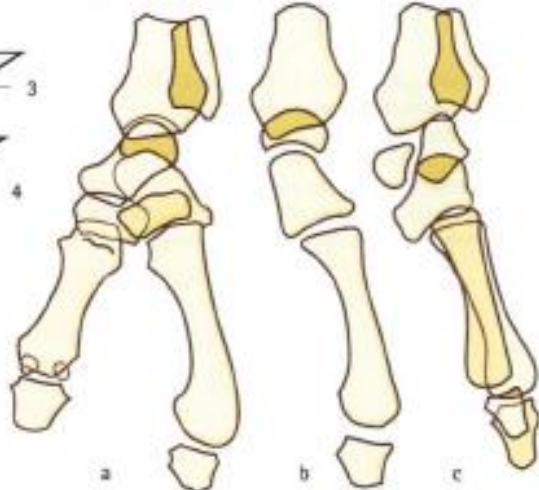


Fig. 30

OSTEOCINEMATICA

ARCOS TRIDIMENSIONALES



Fig. 5



Fig. 6

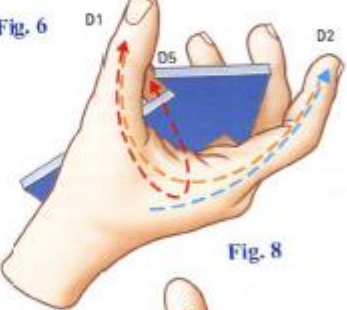


Fig. 8



Fig. 3

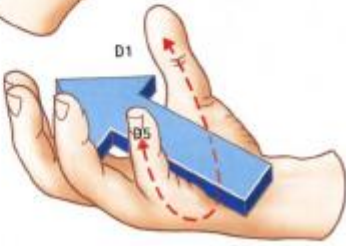


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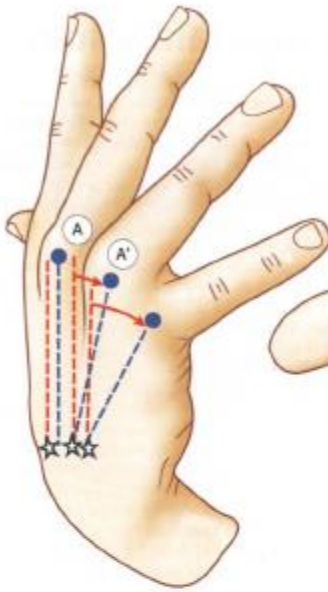


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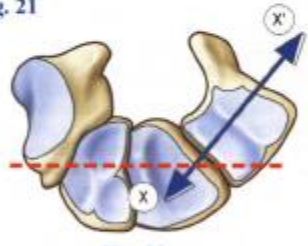
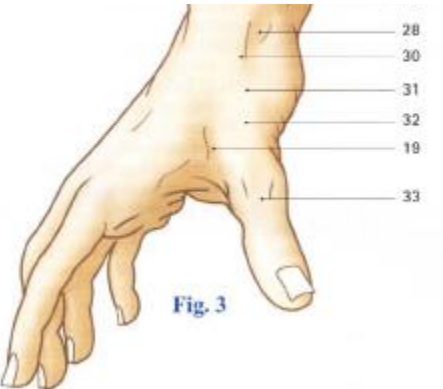


Fig. 23



Fig. 24

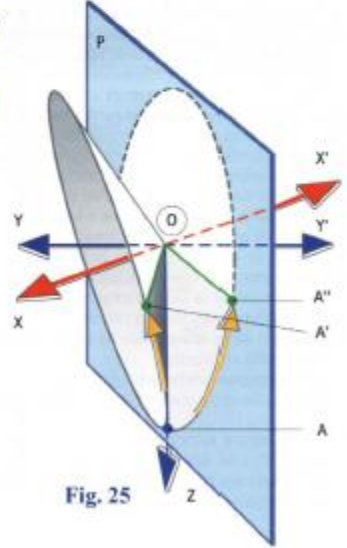


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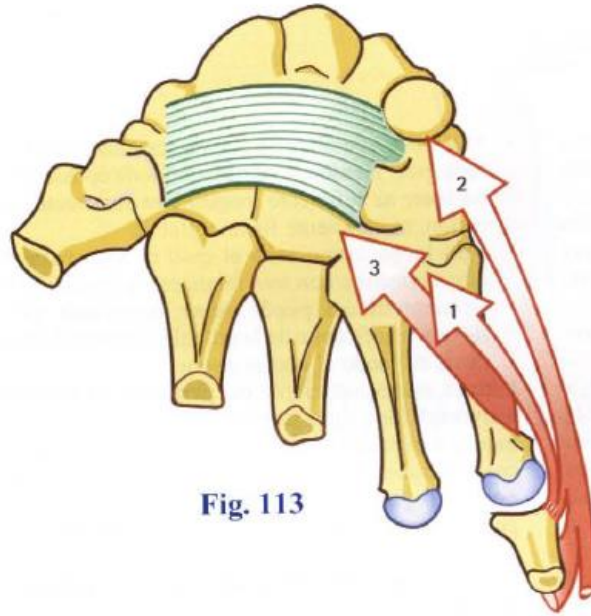


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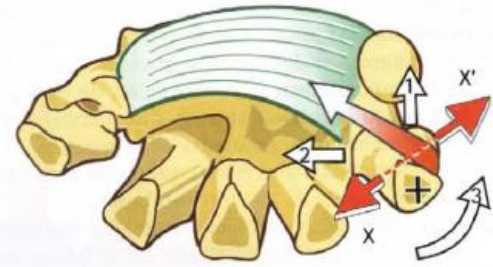


Fig. 114

MOVIMIENTOS DEL V DEDO

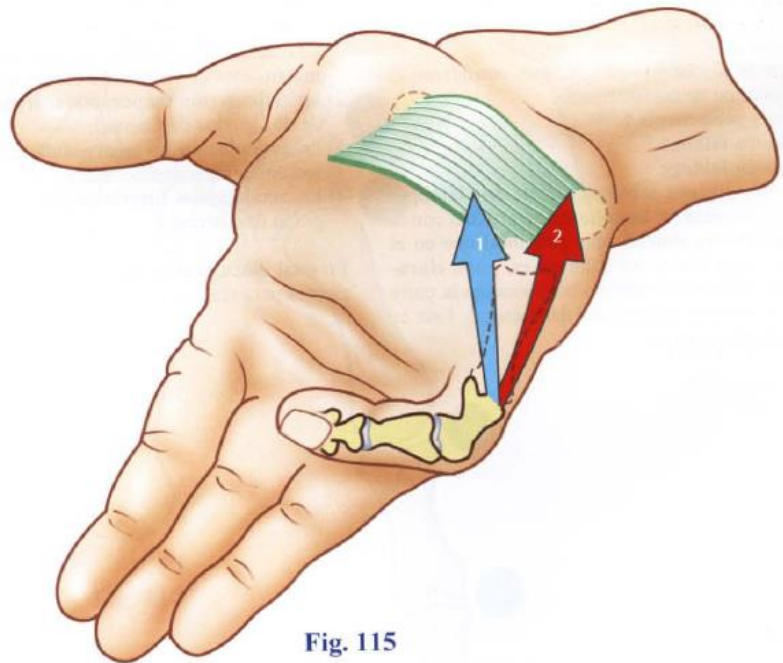
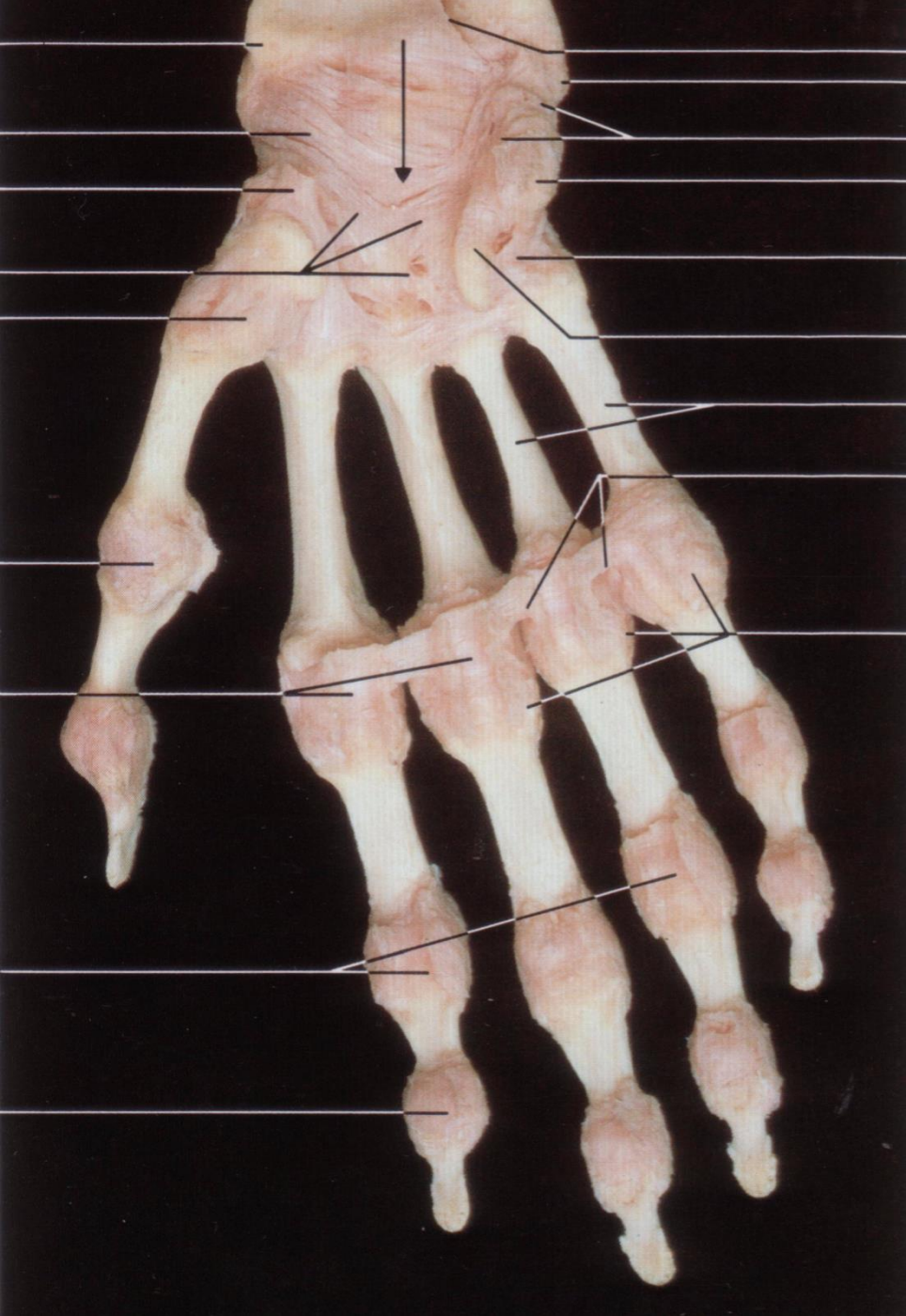


Fig. 115

OSTEO Y ARTROCINEMATICA CARPOMETACARPIANA II A V DEDO

- Flexibilidad y elasticidad a la mano
- artrodias con poca curvatura
- Mtc mas fijos: II Y III,
- mas moviles: IV y V por silla de montar con gancho
- Muy congruentes con mucho deslizamiento dorso - palmar



METACARPOFALANGICAS

Estructuras articulares

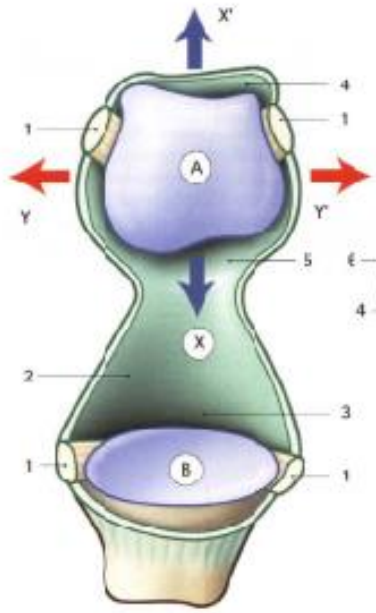


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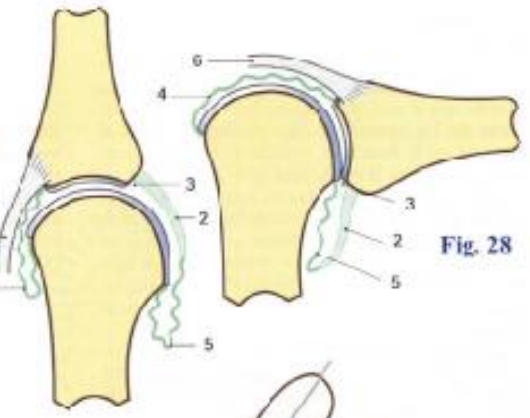


Fig. 27

Fig. 28

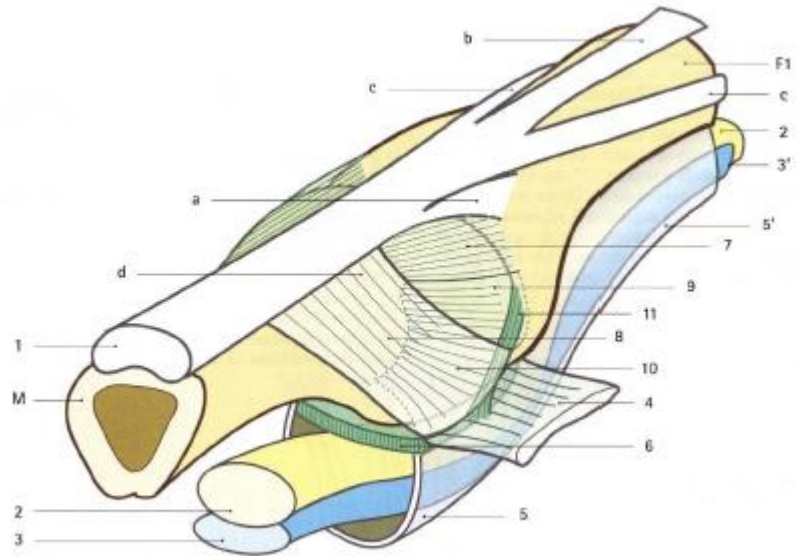
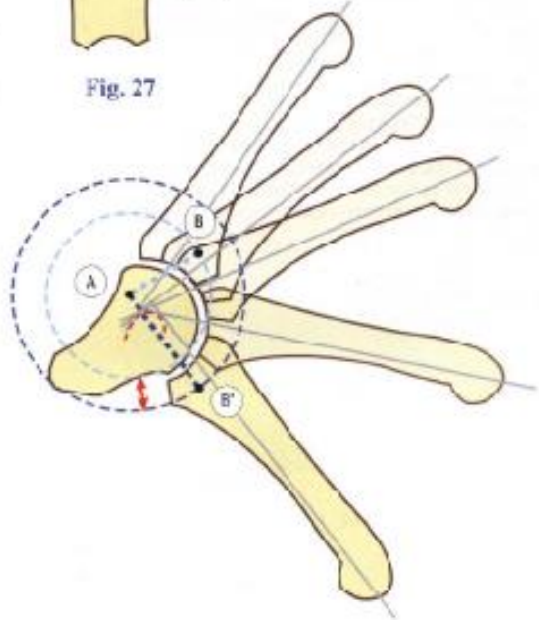


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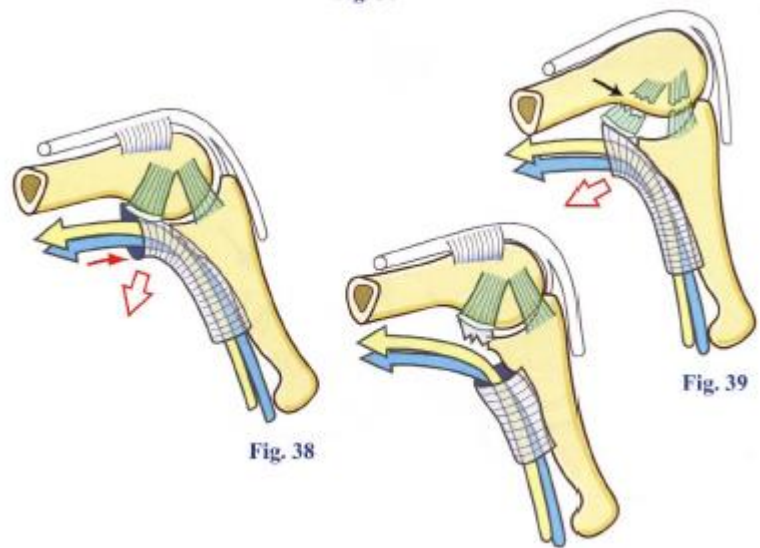


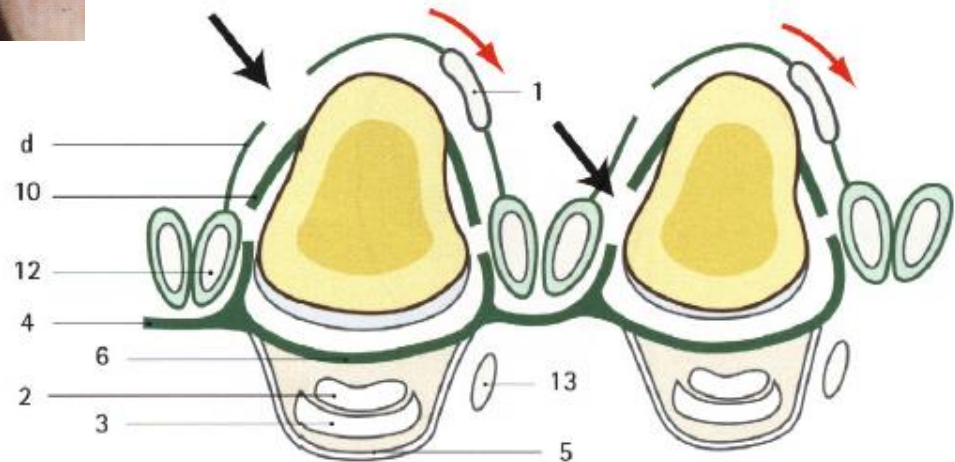
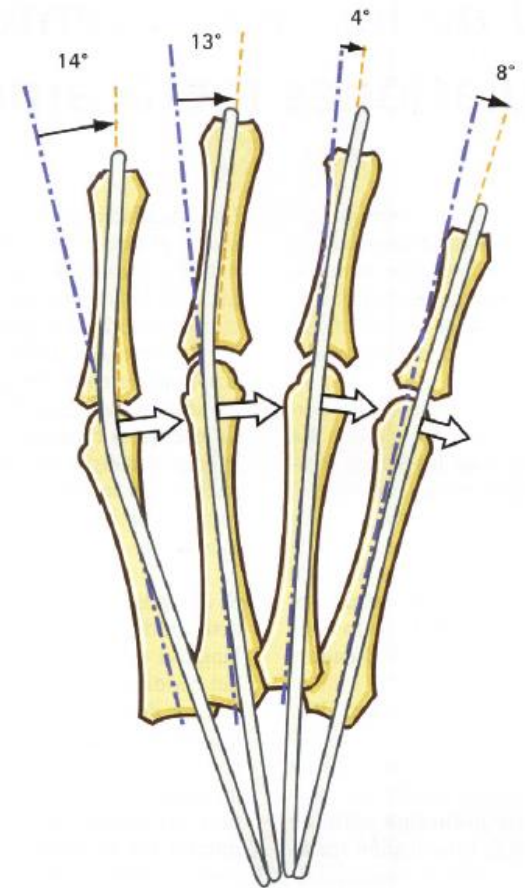
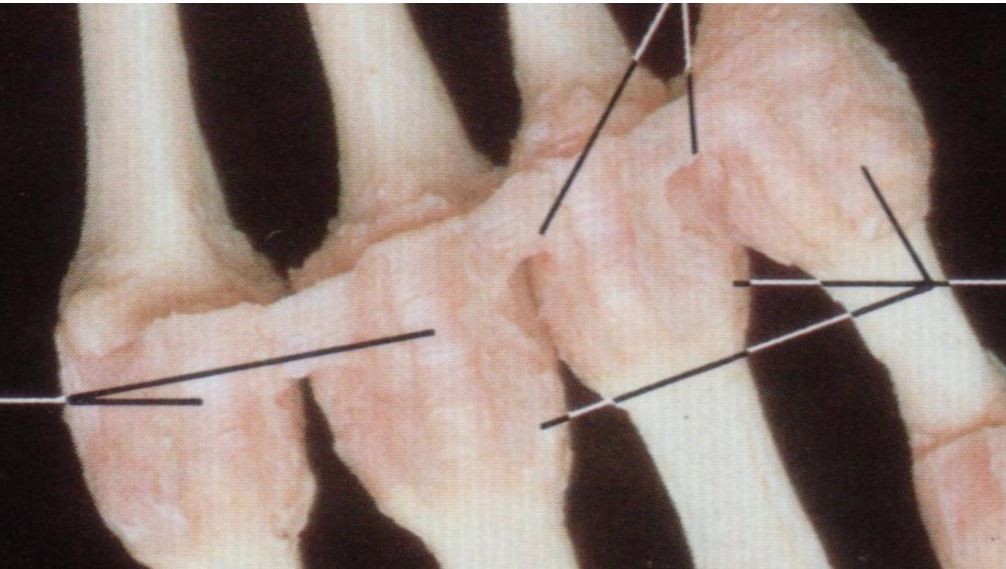
Fig. 38

Fig. 39

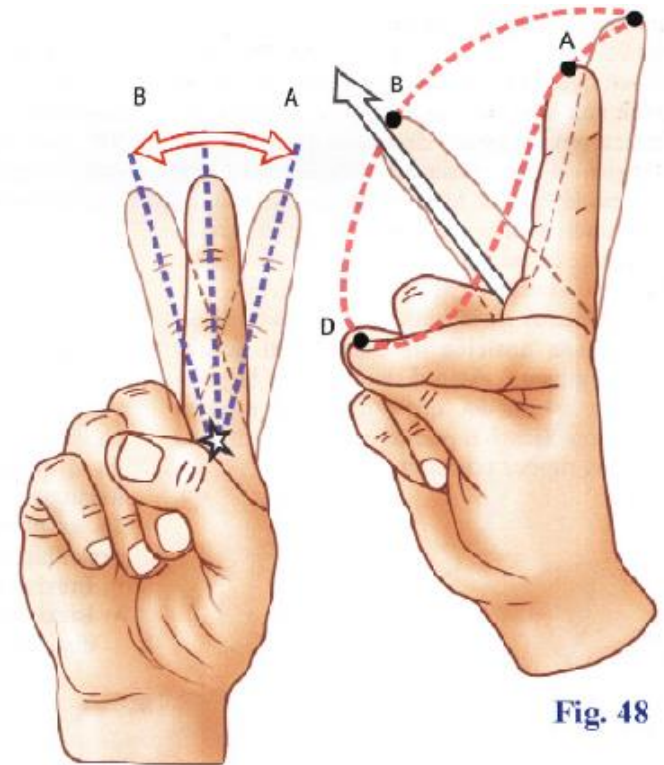
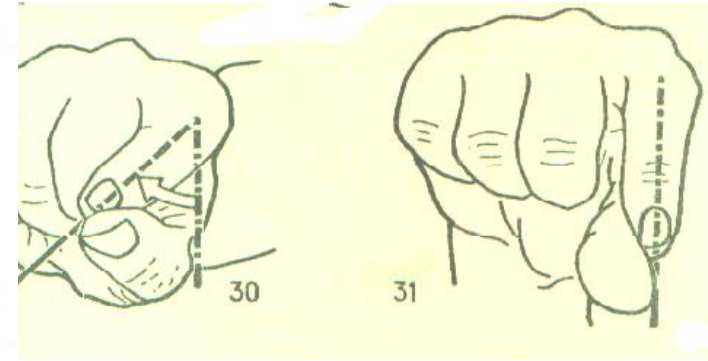
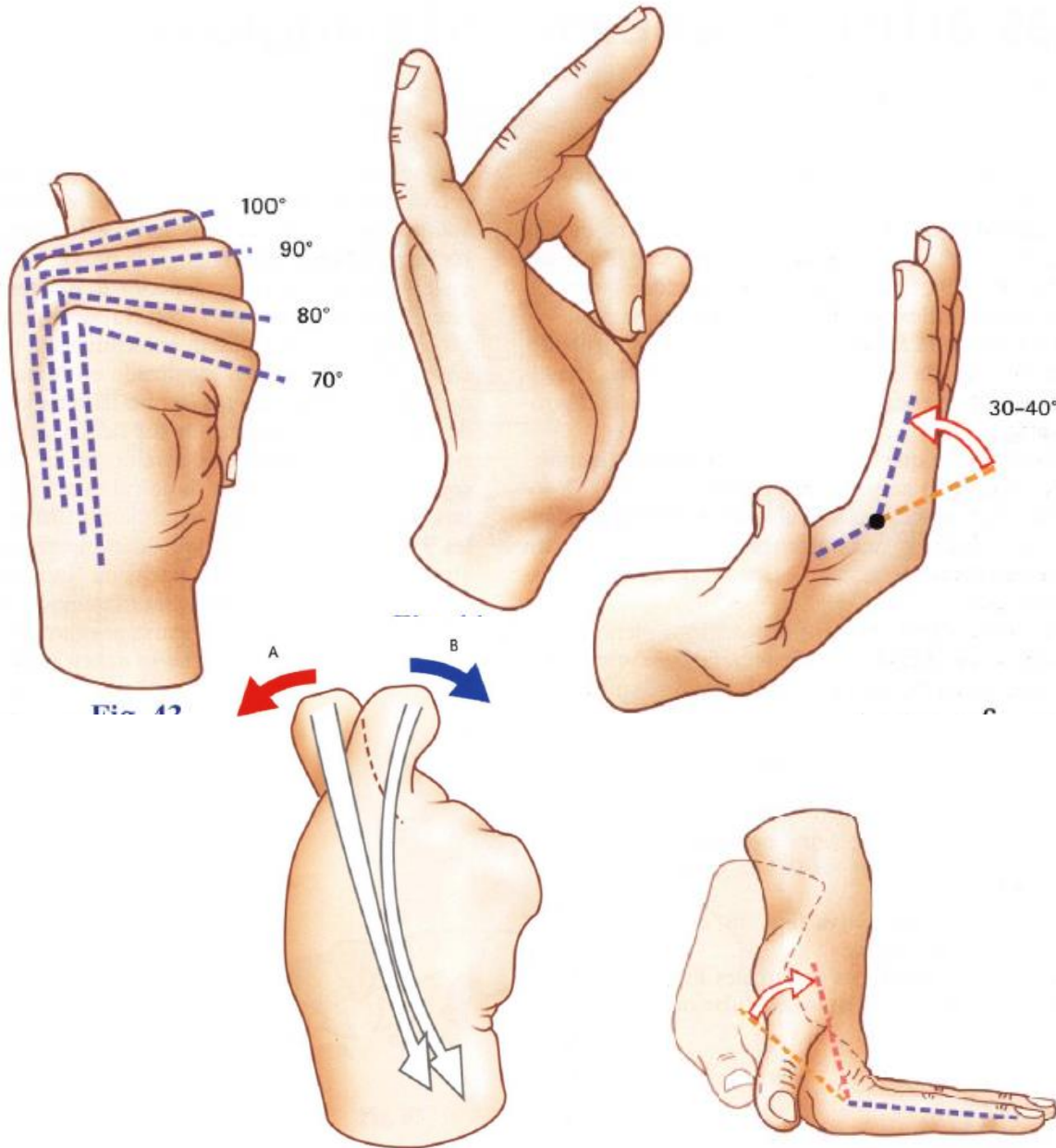
Fig. 40

METACARPO FALANGICAS

Estructuras articulares
Desviacion cubital



OSTEOCINEMATICA MtcF



OSTEOCINEMATICA MtcF

accion ligamentaria

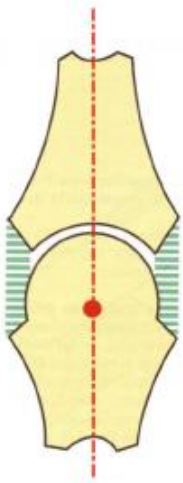


Fig. 31

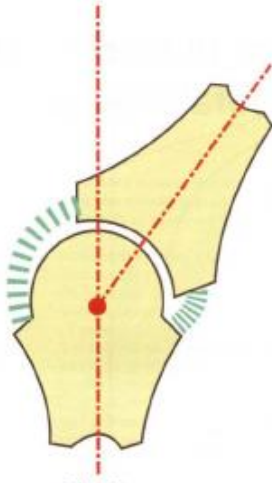


Fig. 32



Fig. 33



Fig. 34

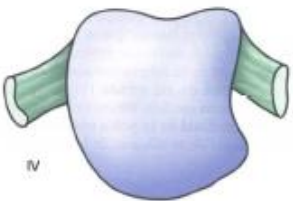


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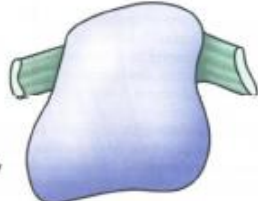
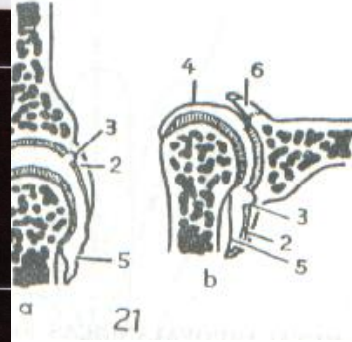
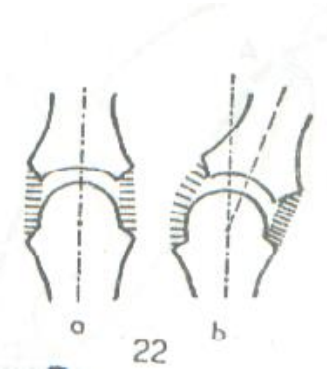


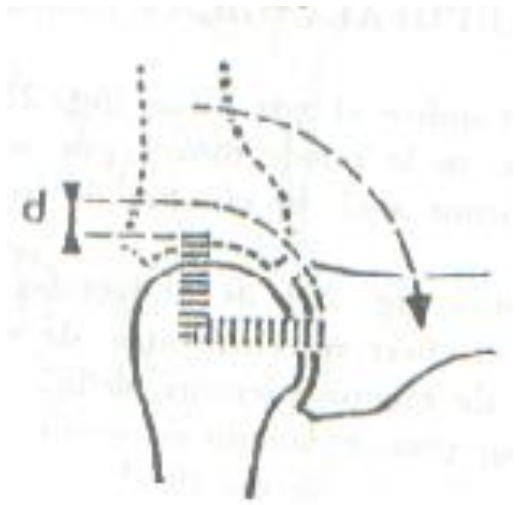
Fig. 36



21



22



d

ARTROCINEMATICA MtcF

- Condilea, anatomica y mecanica simple
- Convexo-concava
- Rodado- deslizamiento
- Biaxial + rotacion axial pasiva
- Extremo distal Mtc unido por ligamento Transverso del metacarpo

INTER-FALANGICAS PROXIMAL Y DISTAL

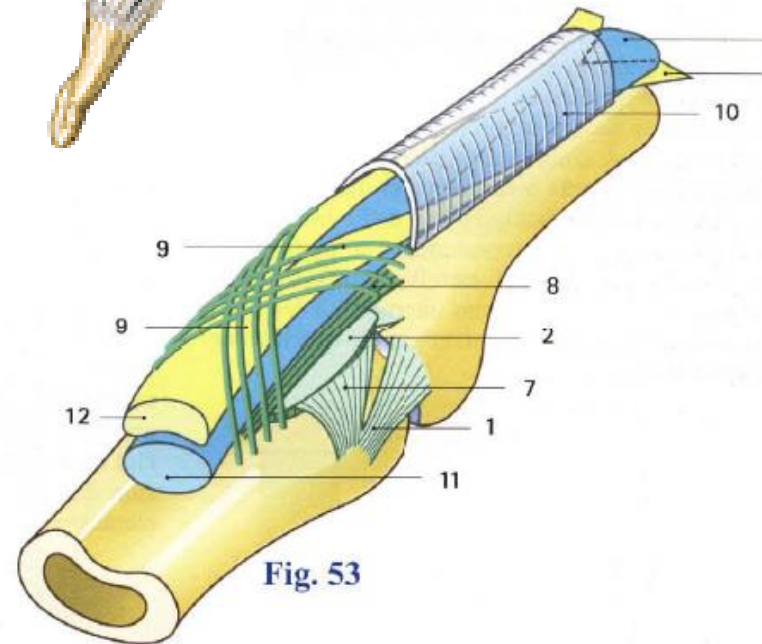
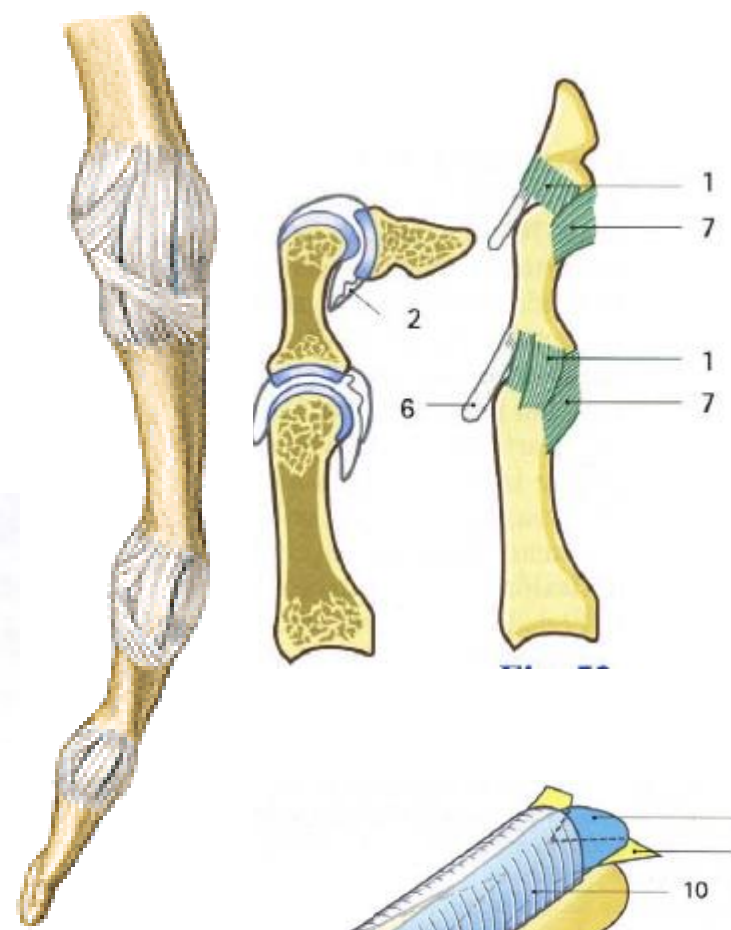
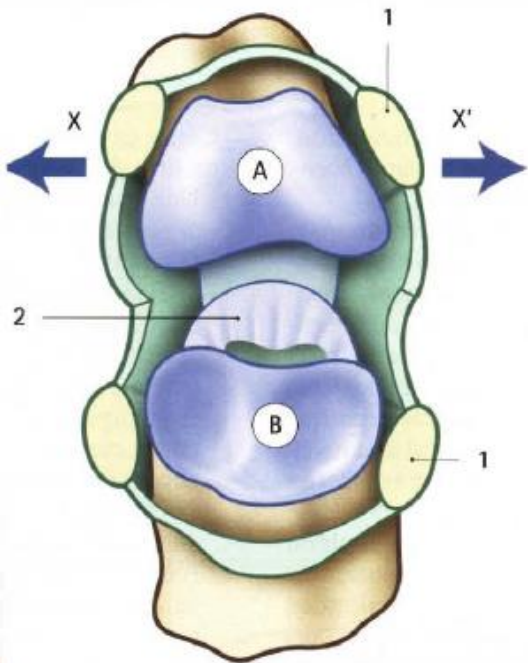
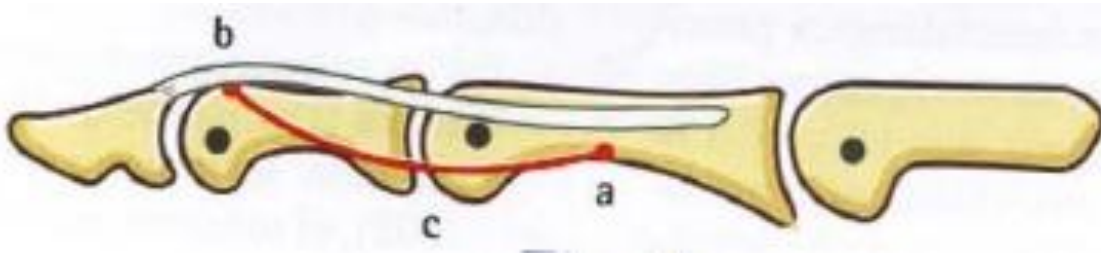
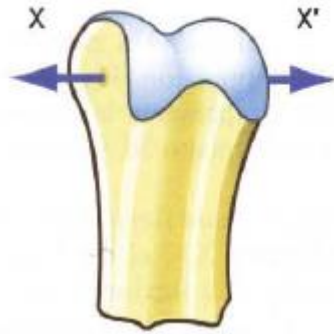


Fig. 53

OSTEOCINEMATICA ITF

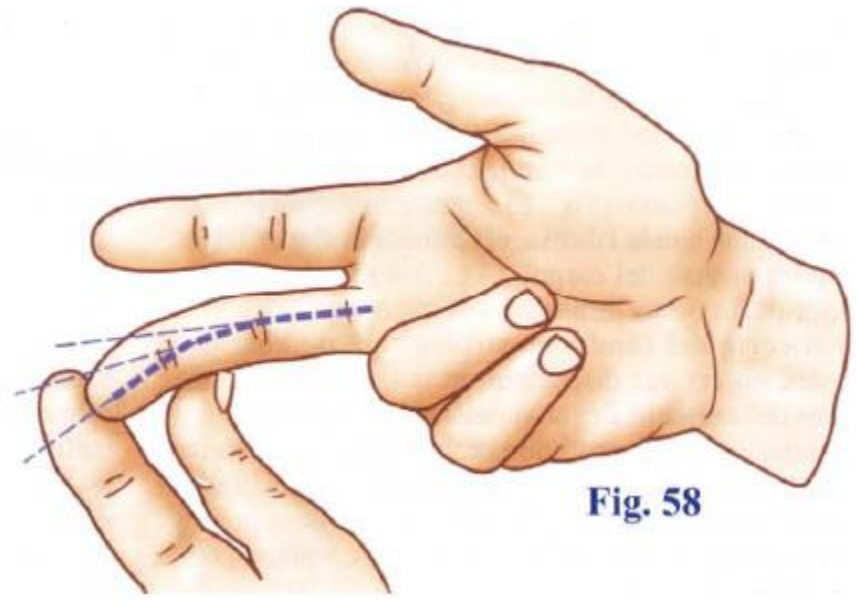
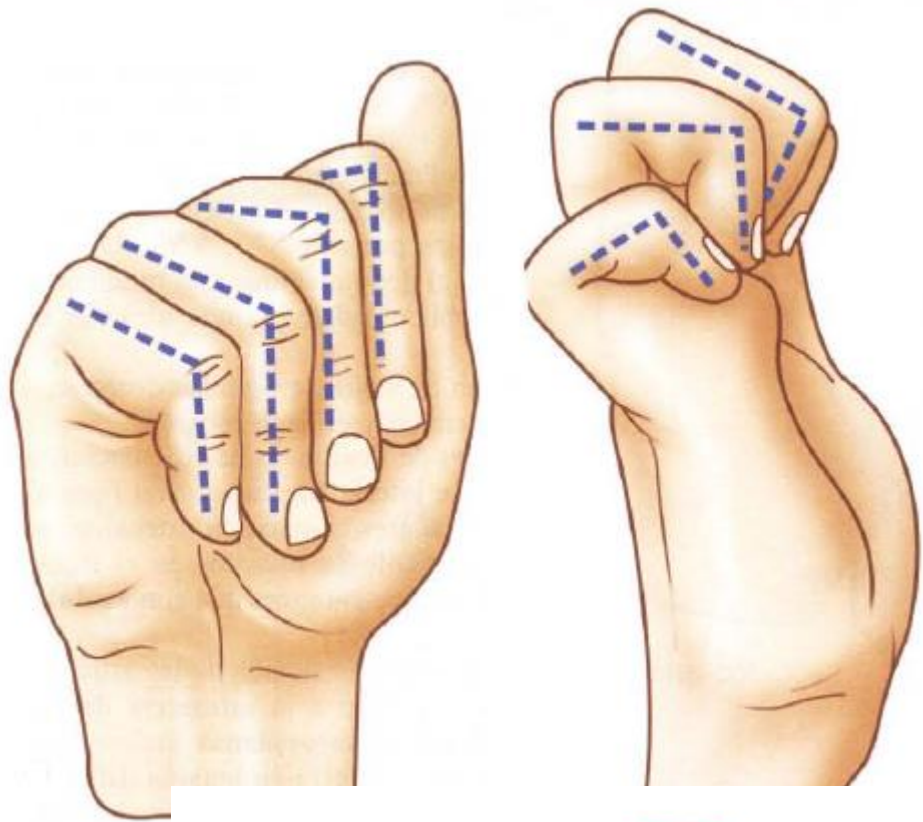


Fig. 58

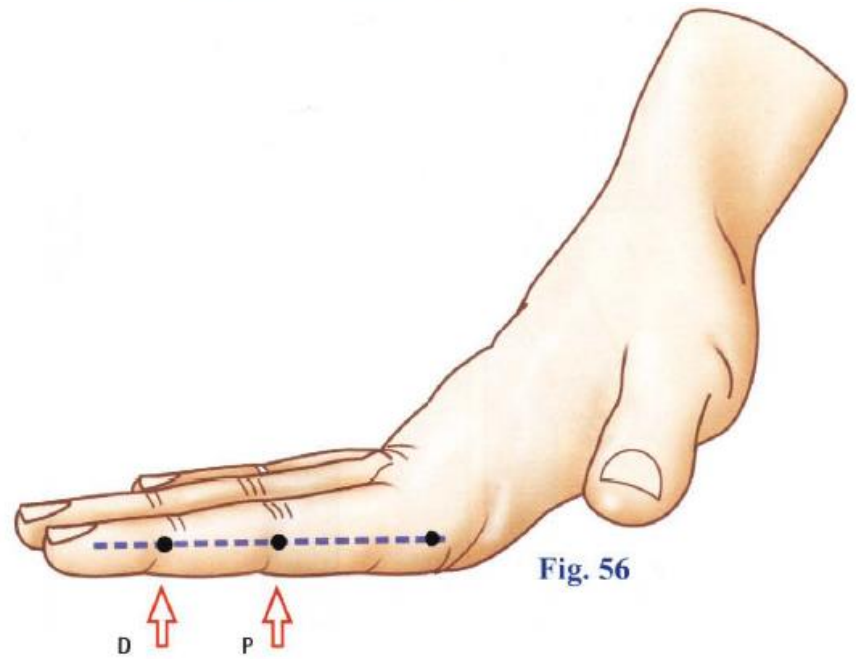
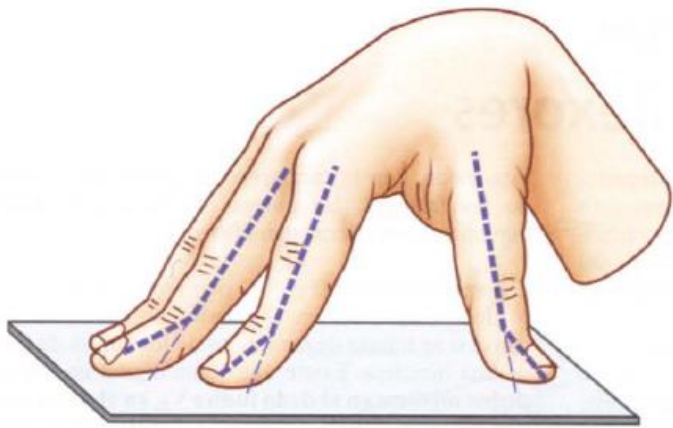
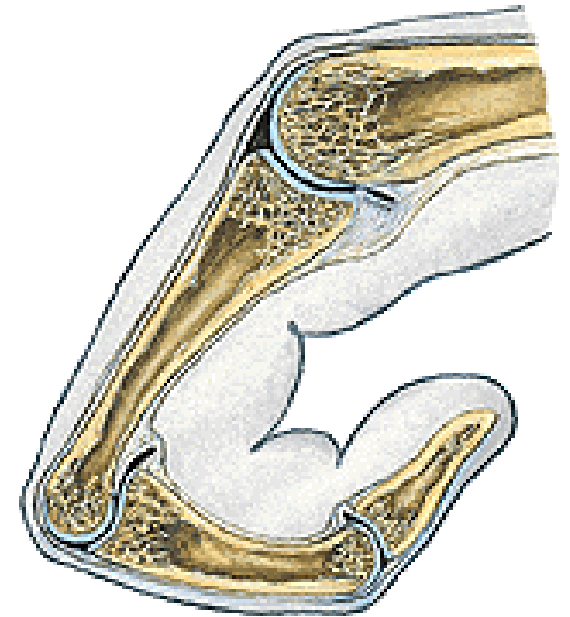


Fig. 56

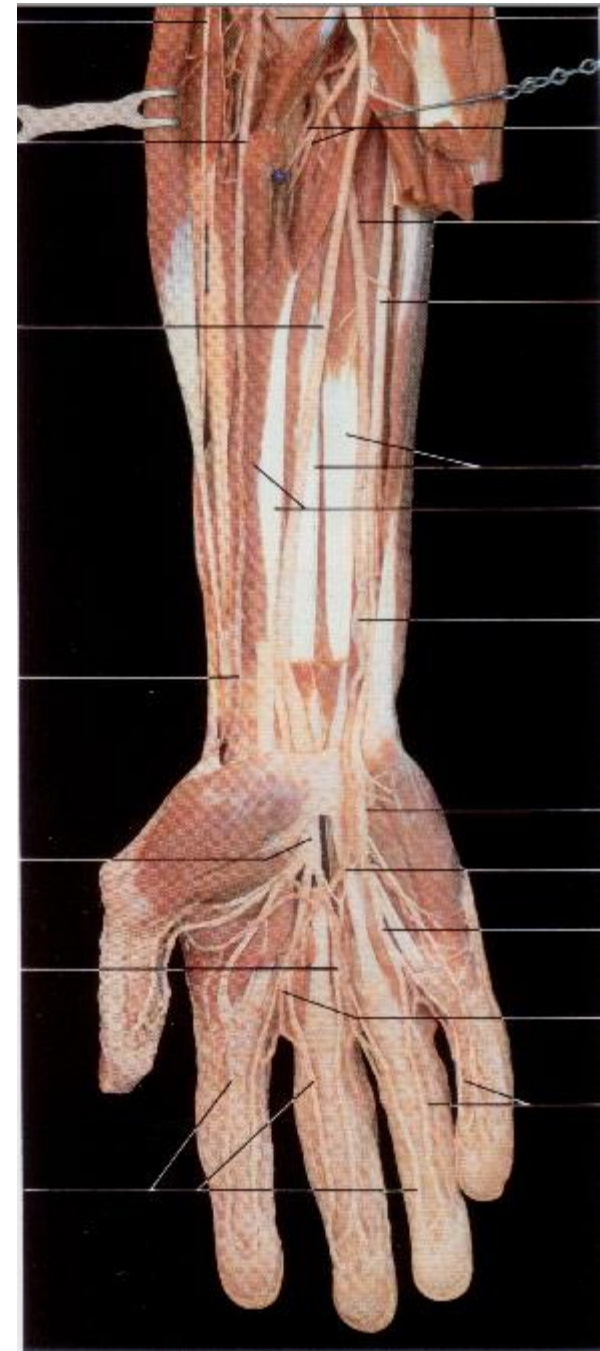
ARTROCINEMATICA INTERFALANGICAS PROXIMAL Y DISTAL

- Troclear
- Sellar alterado
- Anatomica y mecanica simple
- Convexo concava
- Rodado - deslizamiento

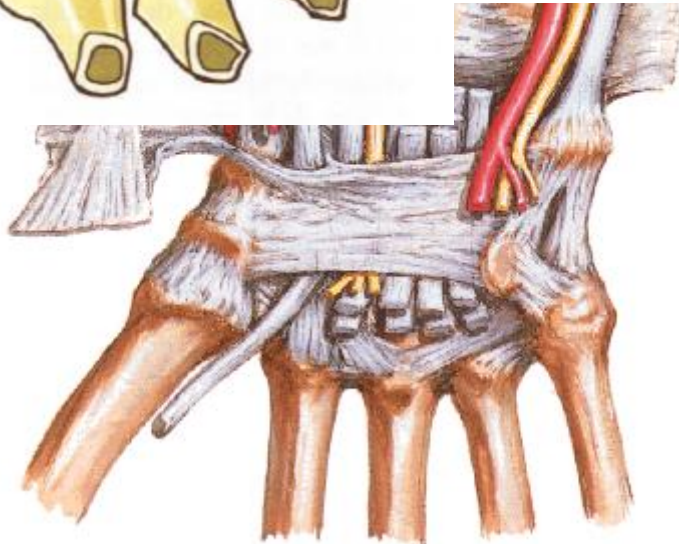
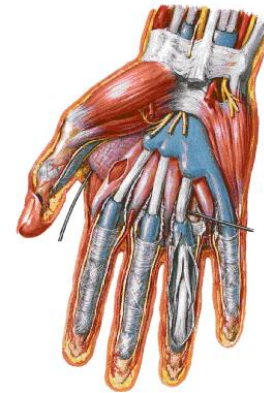
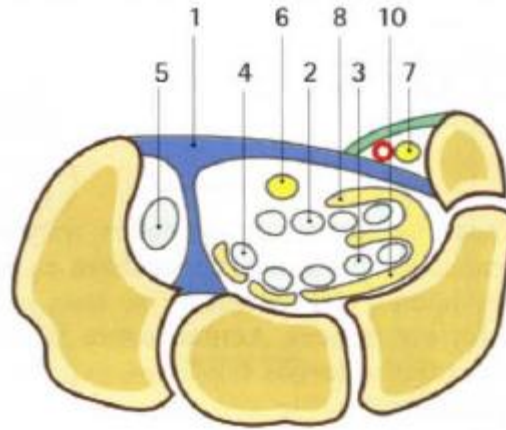
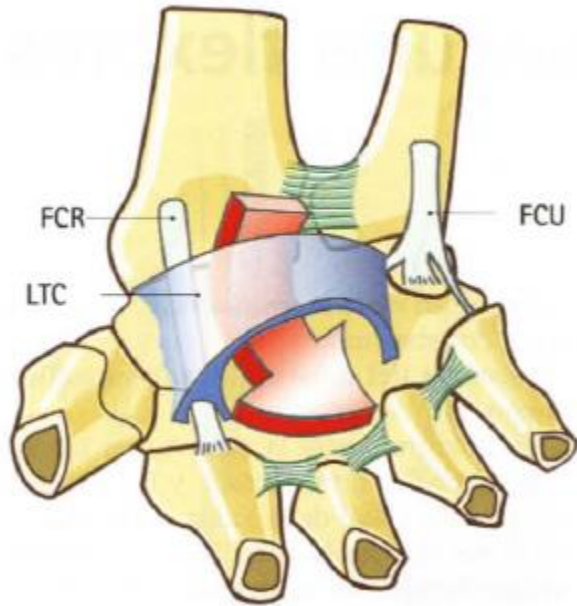


MIOCINETICA FLEXION

- FLEXOR COMUN
 - SUPERFICIAL
 - PROFUNDO
- LUMBRICALES
- INTEROSEOS



VAINAS FIBROSAS Y SINOVIALES



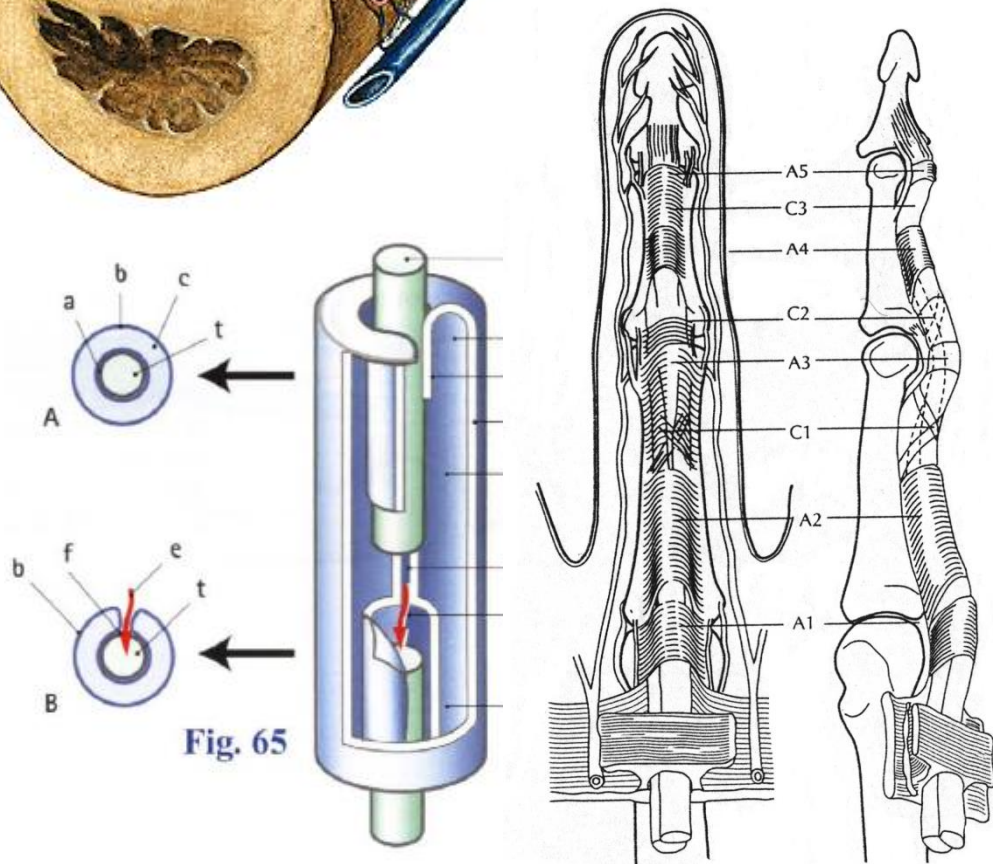
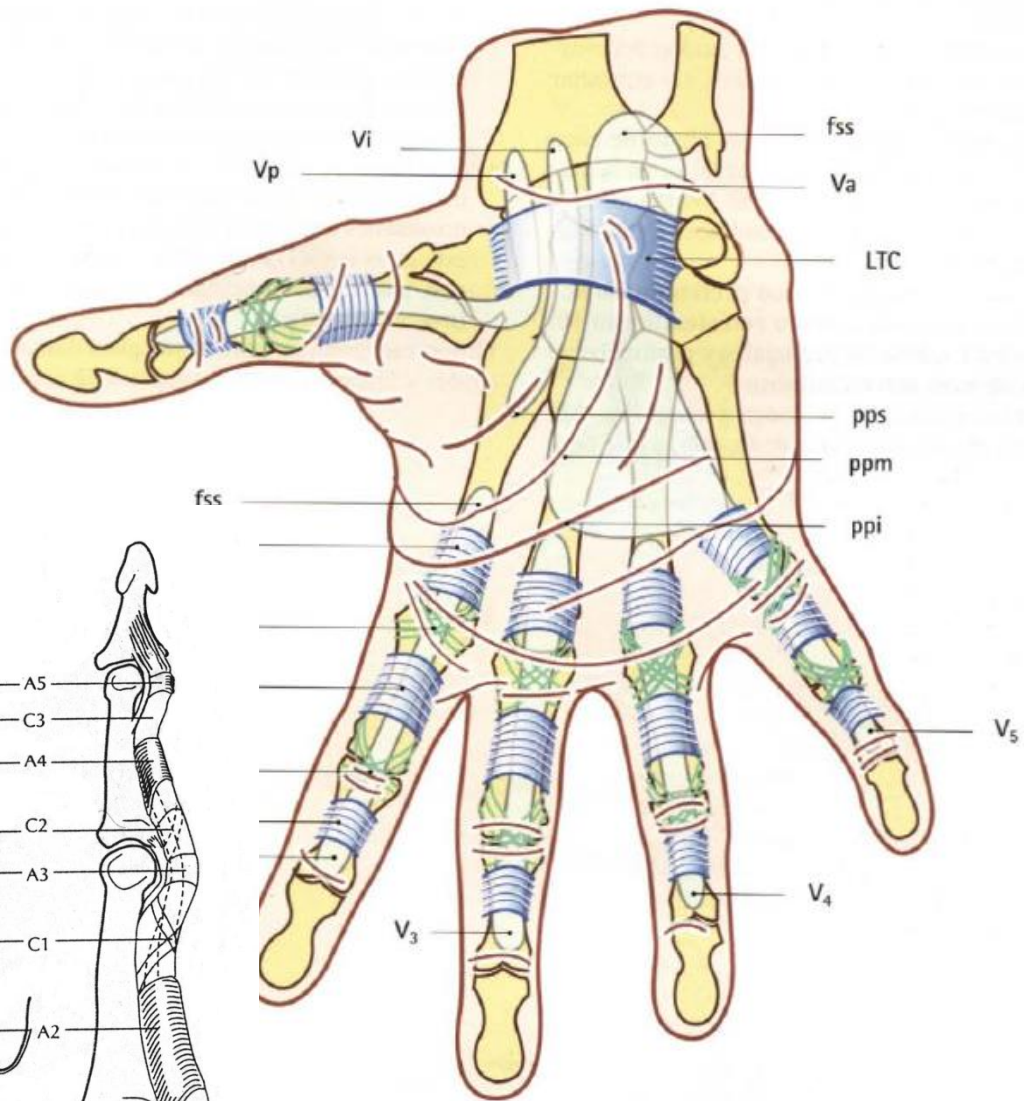
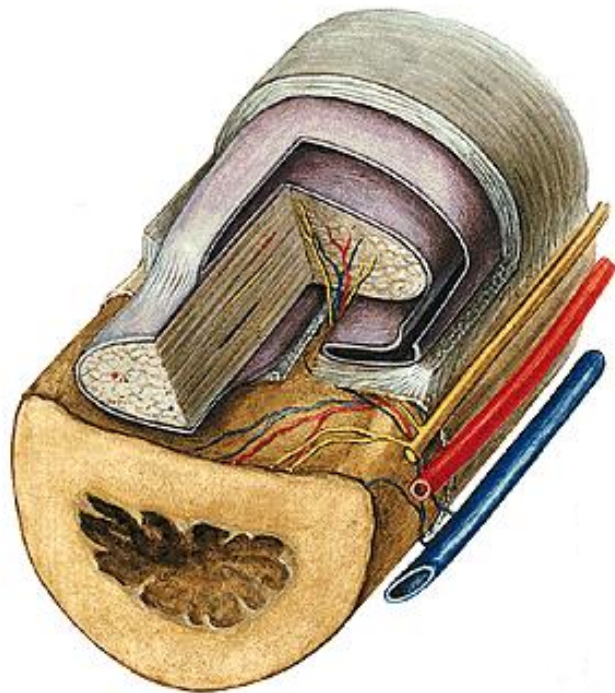


Fig. 65

MIOCINETICA FLEXION

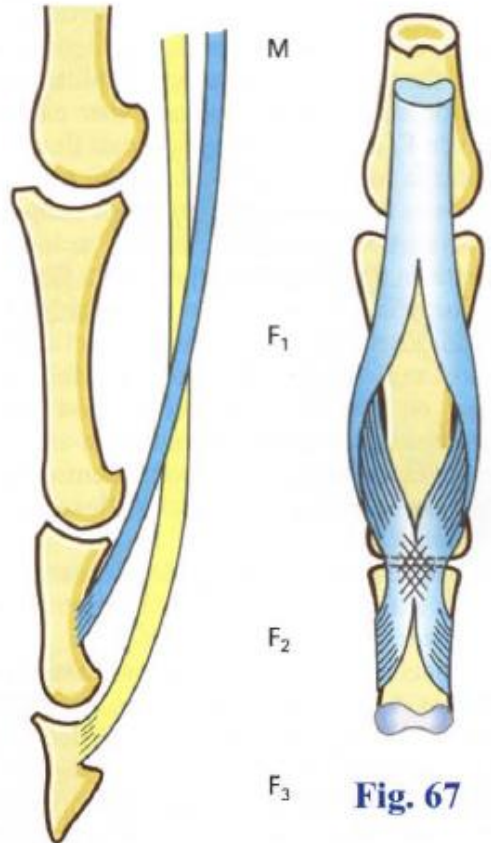


Fig. 67

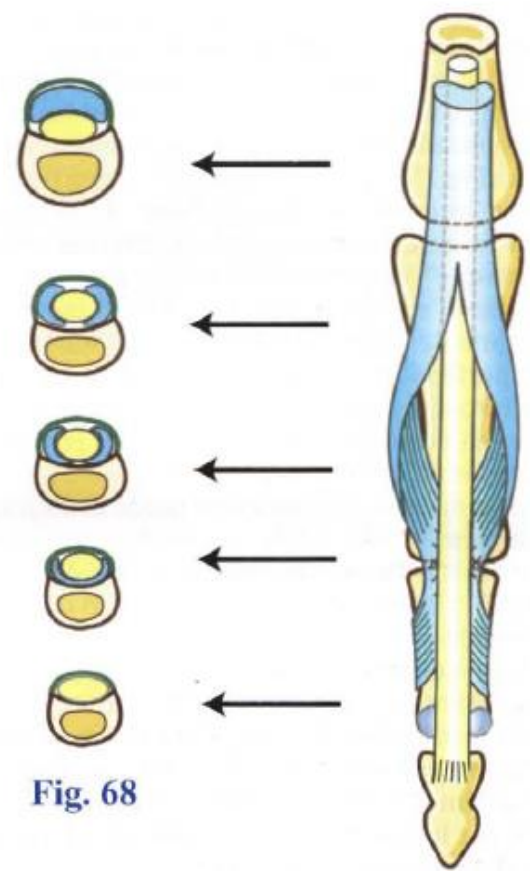


Fig. 68

FUNCIONES DE LAS VAINAS

- evitar el efecto de cuerda de arco
- cambiar la dirección de las fuerzas
- brindar la capacidad de deslizamiento del tendón

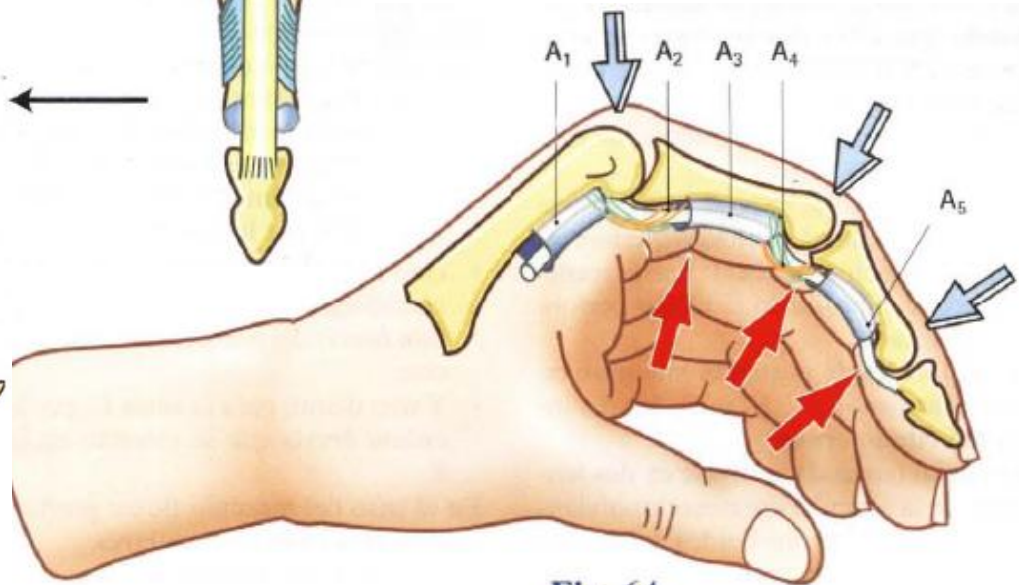
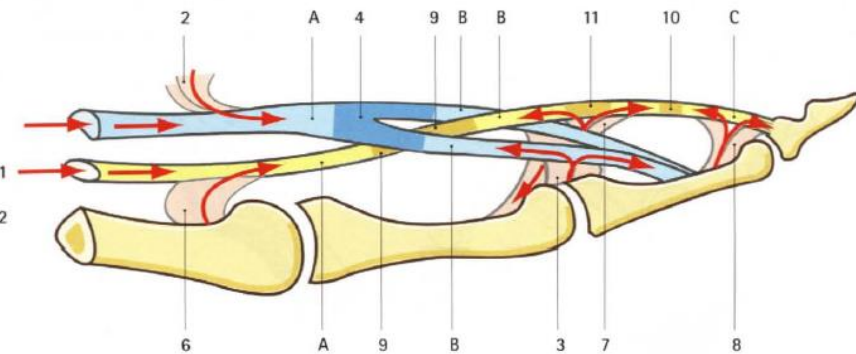
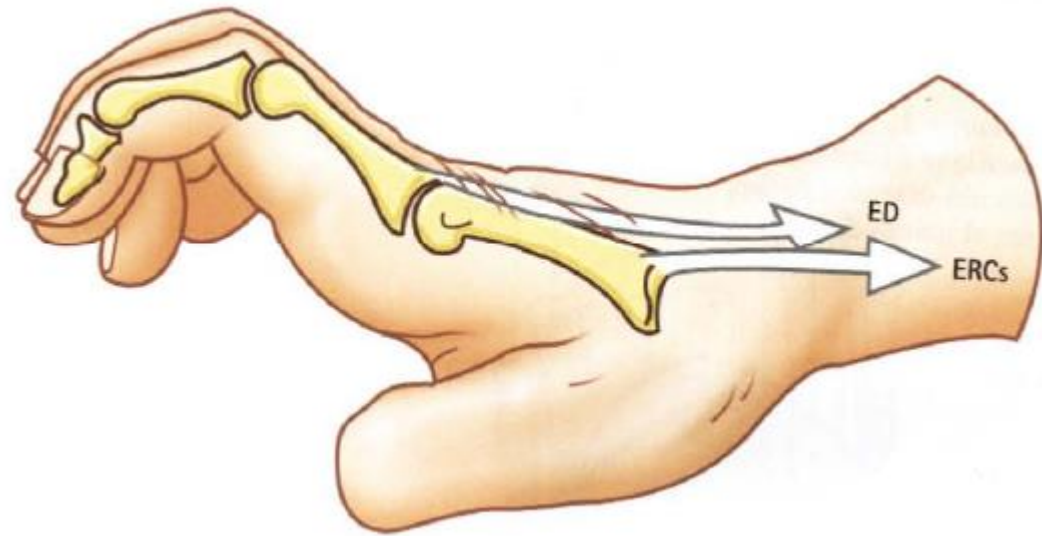
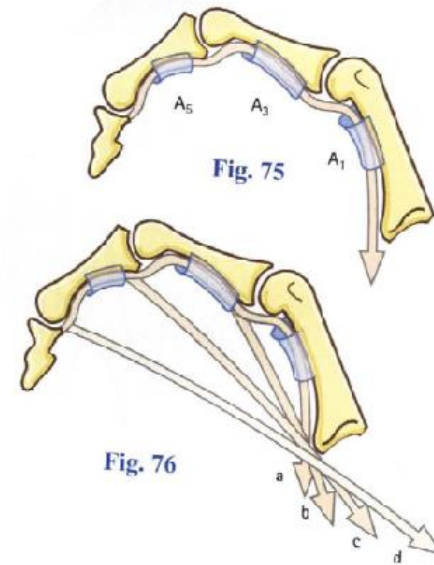
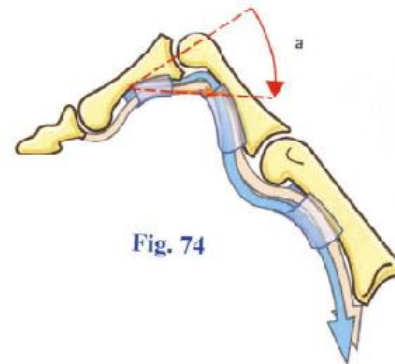
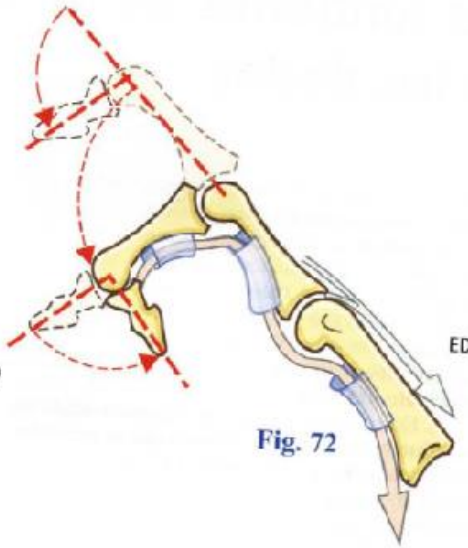
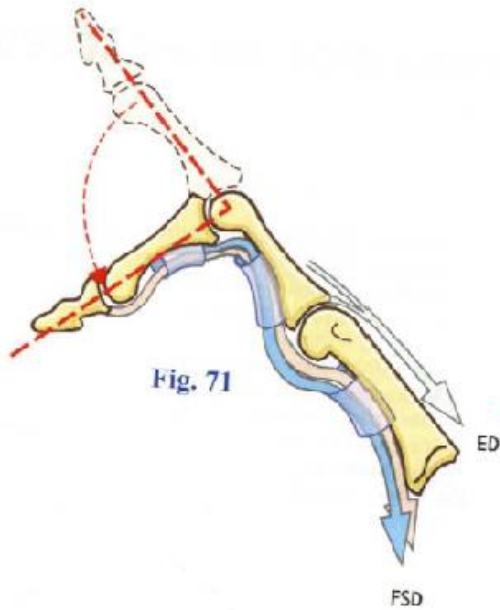


Fig. 64

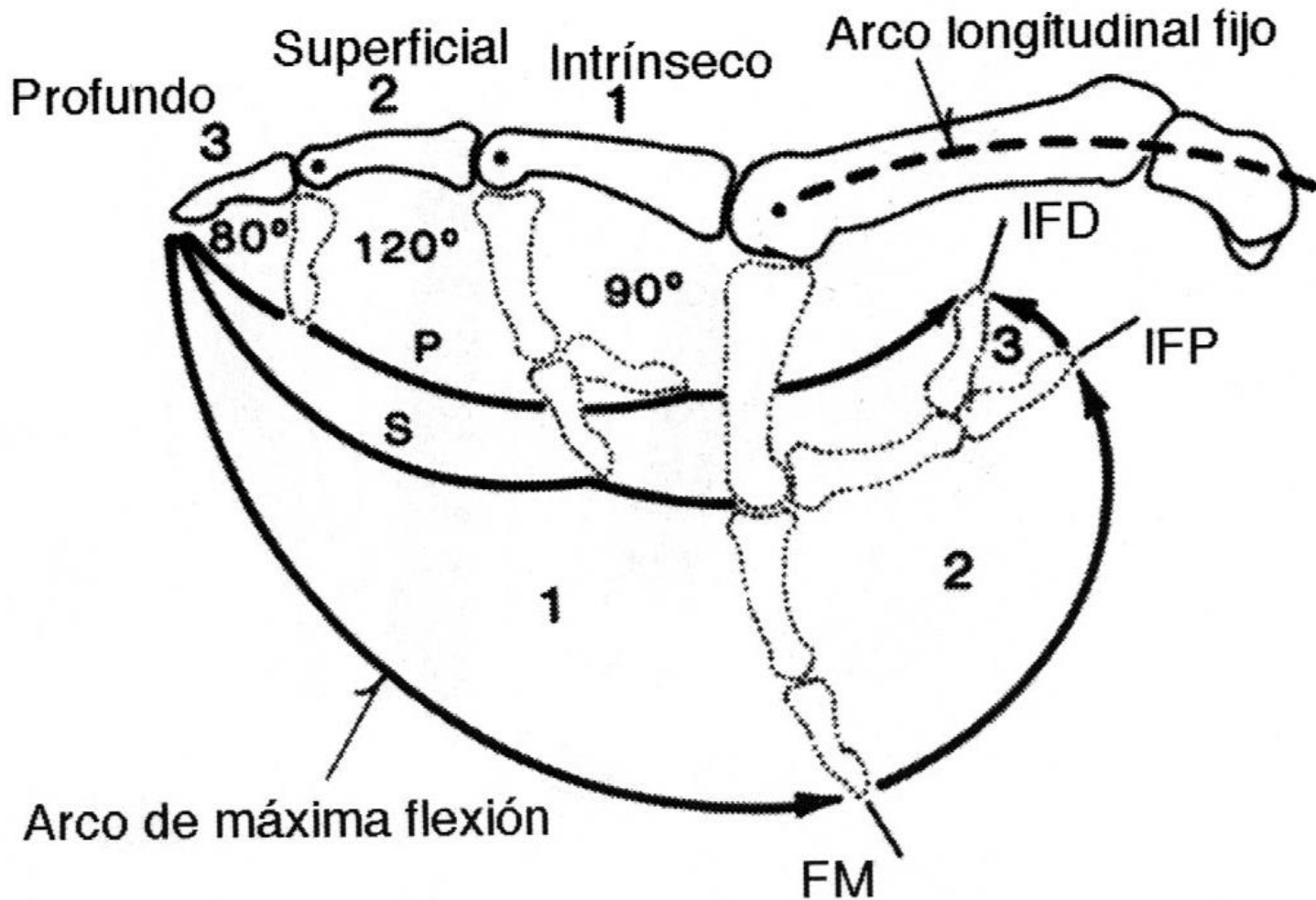
MIOCINETICA



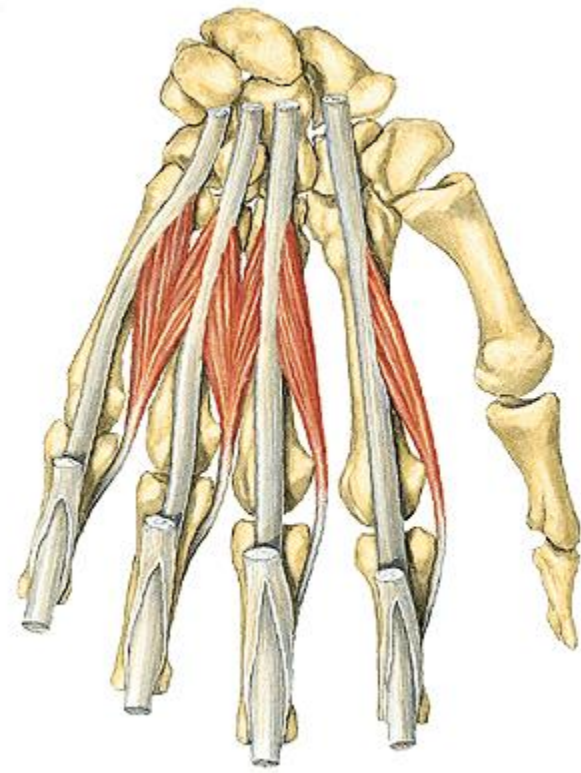
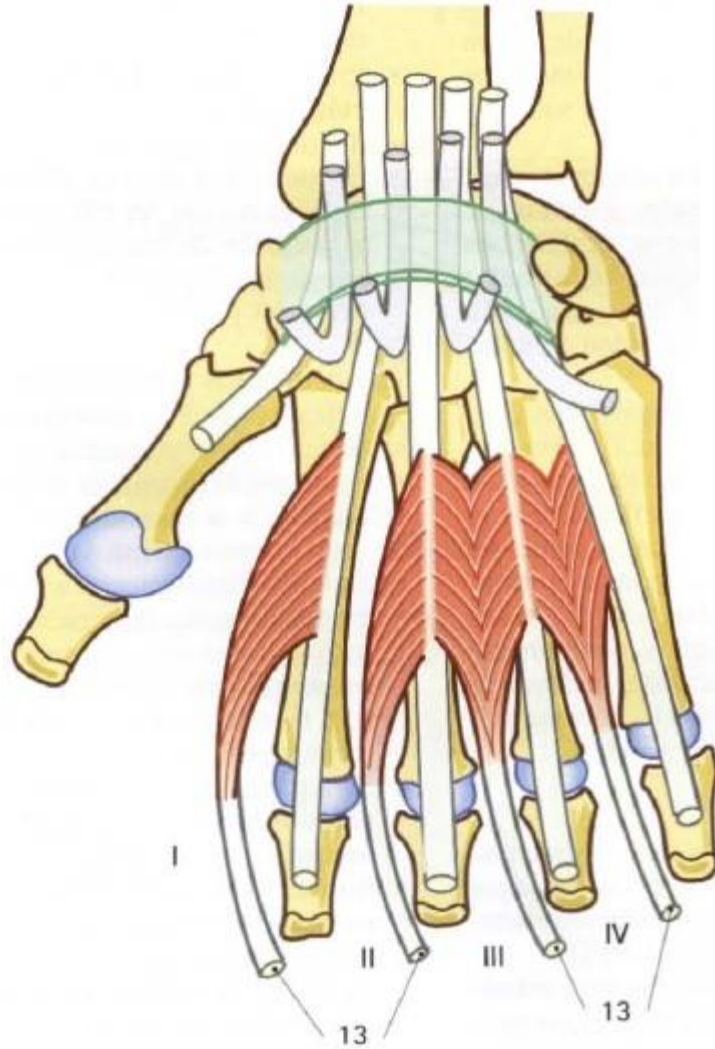
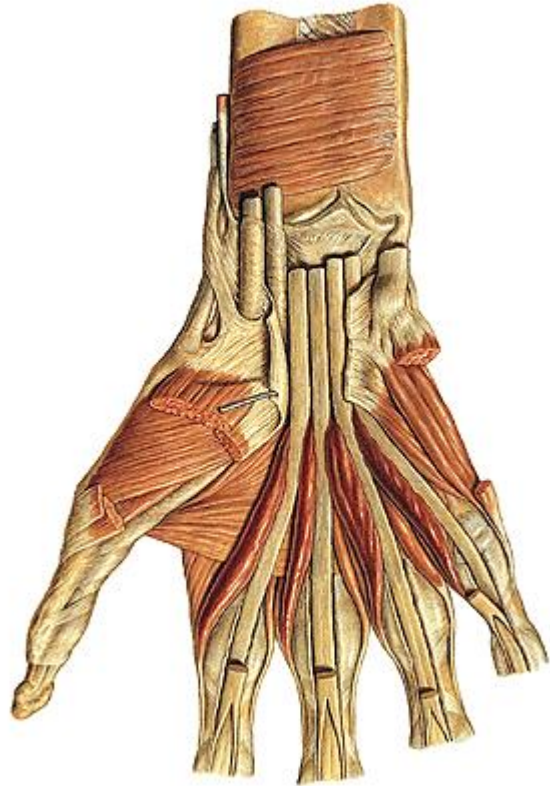
FLEXION



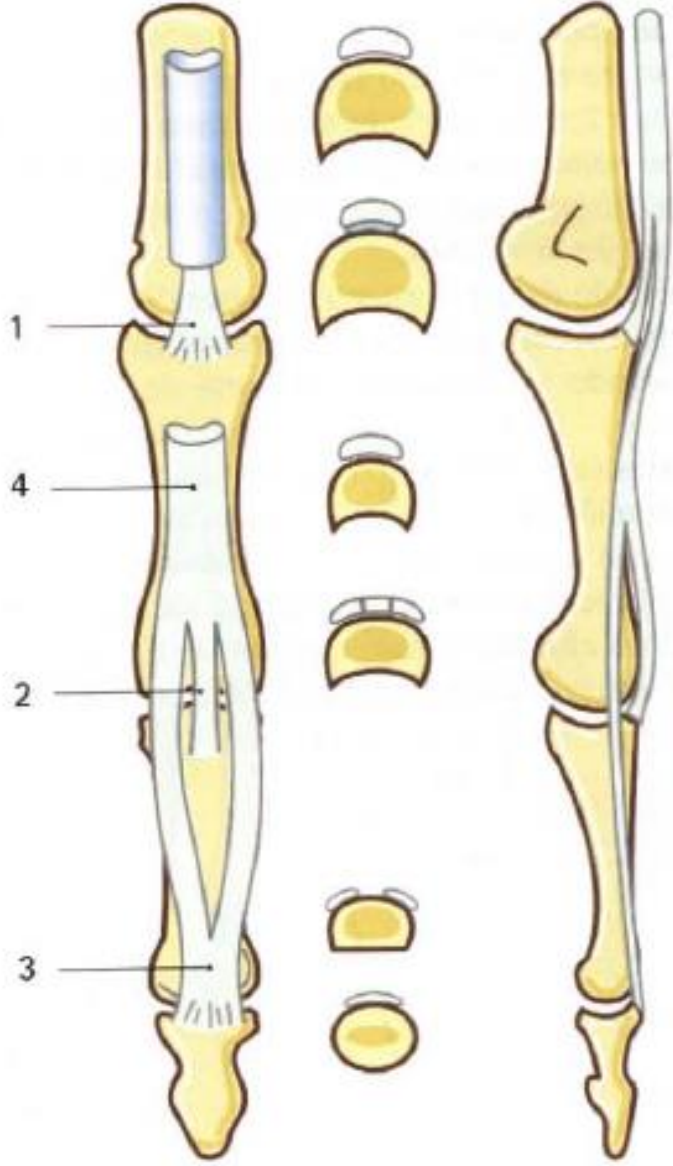
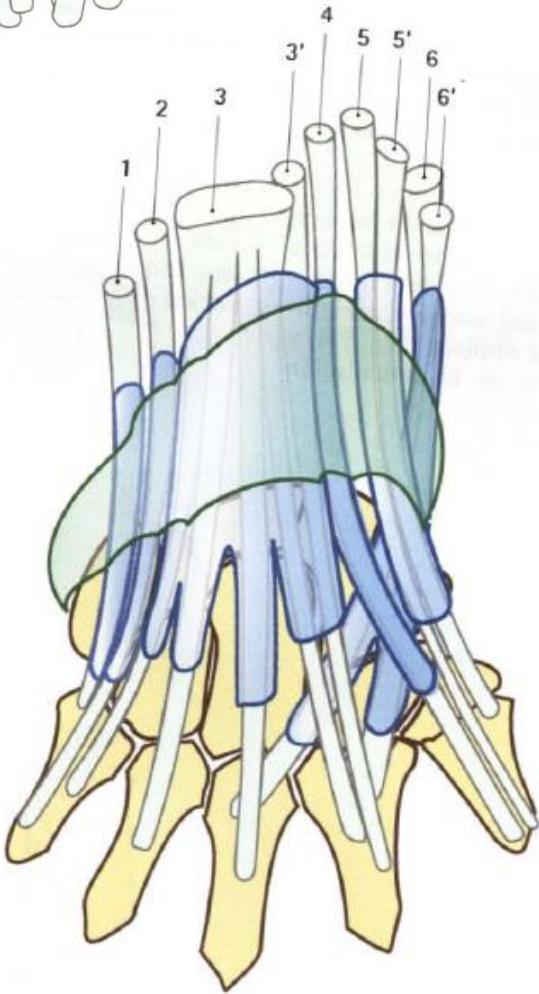
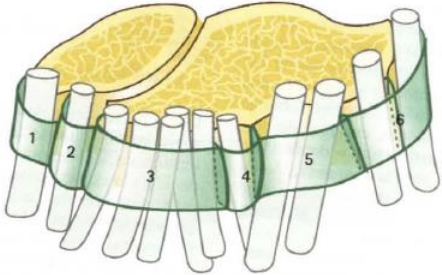
FLEXION



INTRINSECOS: LUMBRICALES

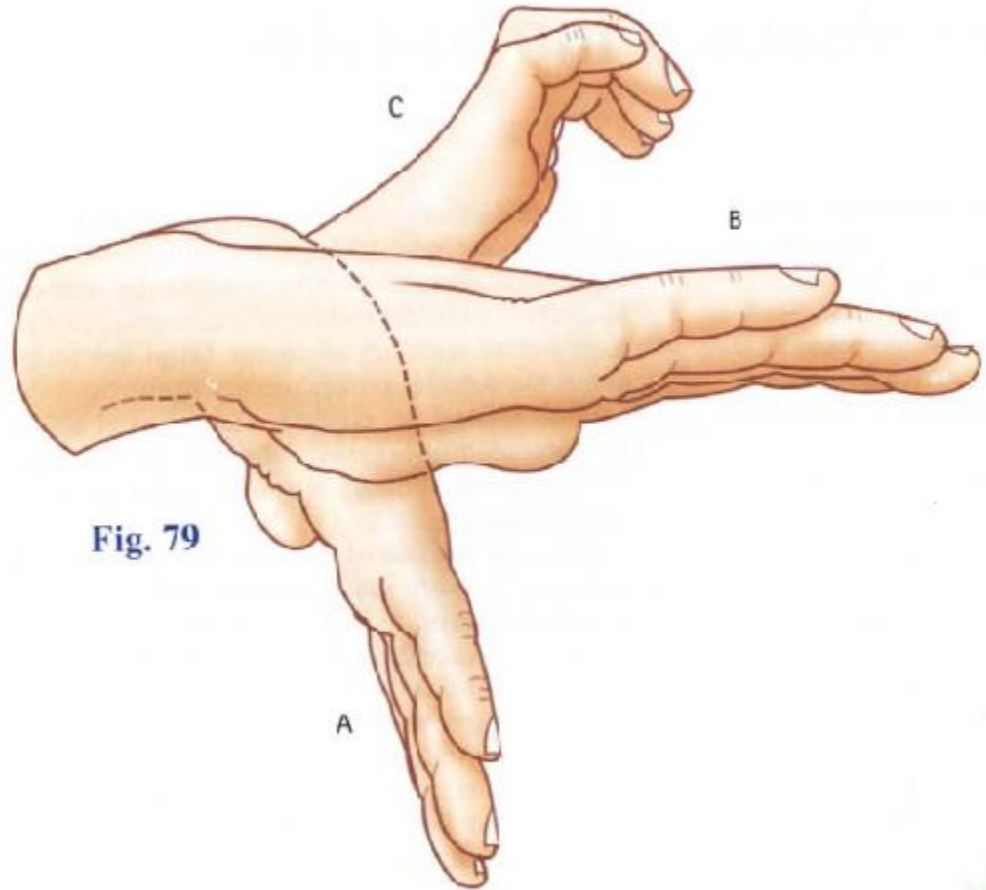


MIOCINETICA EXTENSION

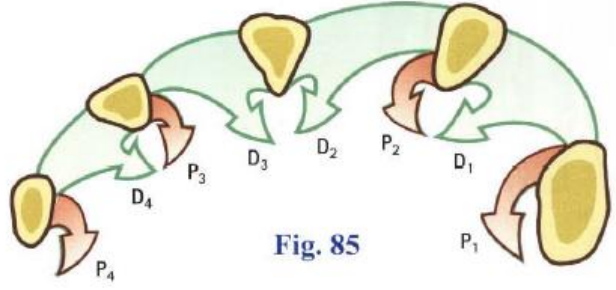


ISOMETRIA FLEXO-EXTENSORES

- SINERGIA

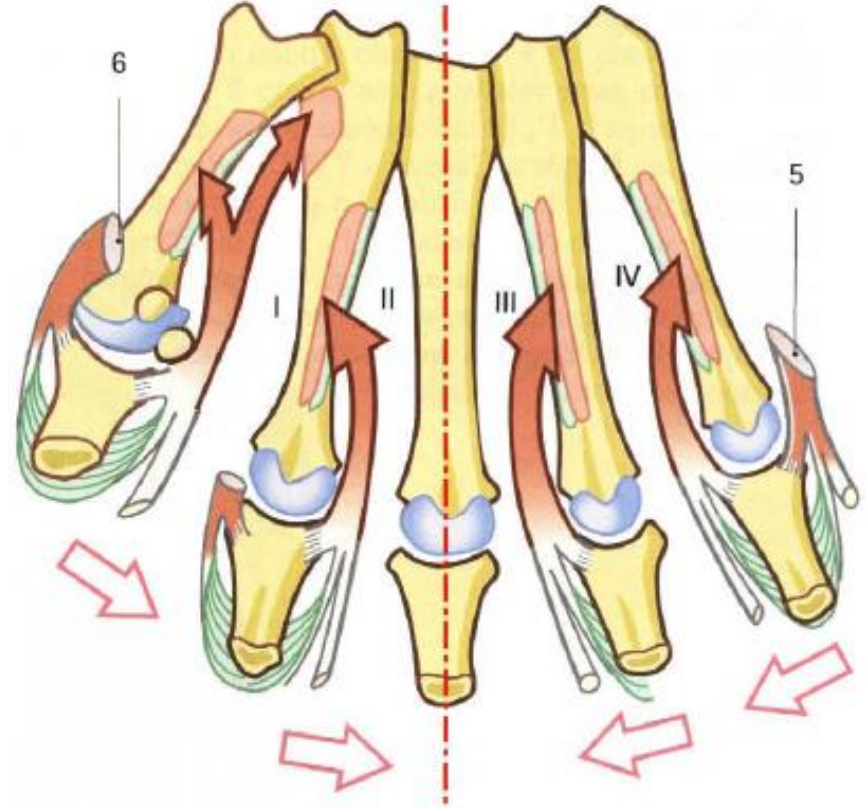
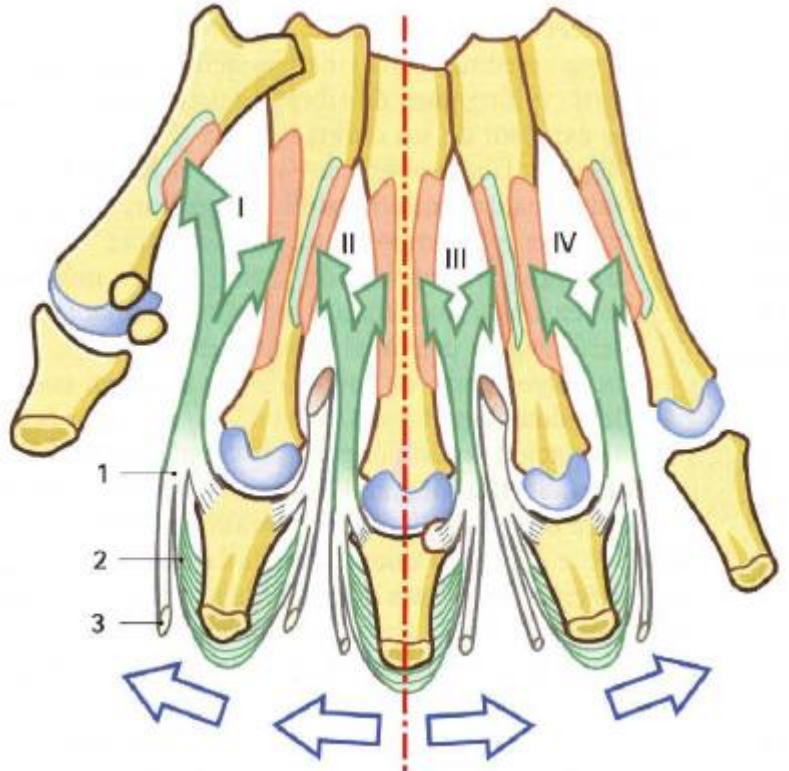


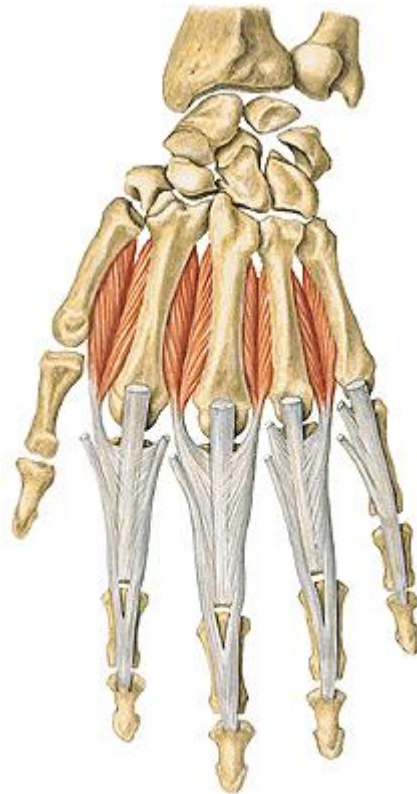
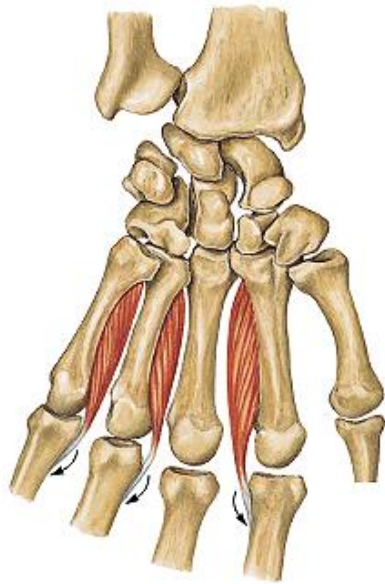
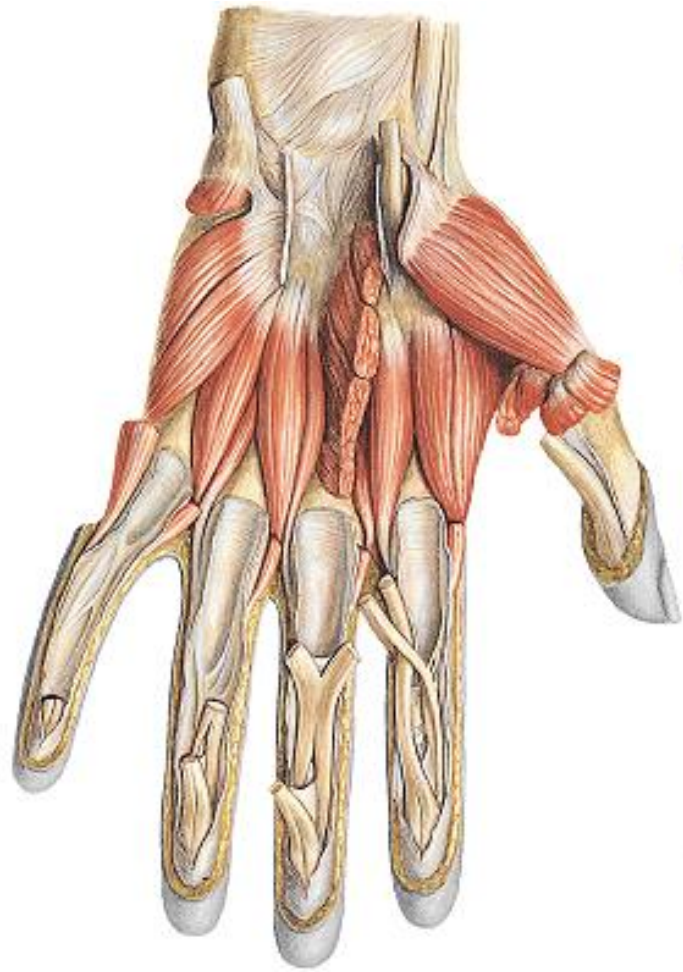
INTRINSECOS: INTEROSEOS



DORSALES

PALMARES





SISTEMA RETINACULAR

FUNCIONES

- Distintas estructuras ligamentarias y fasciales
- Retener y estabilizar el sistema tendinoso y la piel
- Producir un efecto tenodésico de coordinación rítmica en la flexión asociada de las articulaciones interfalángicas
- Dividir a la mano en compartimientos separados encerrando a huesos, articulaciones, nervios, vasos y tendones
- Conformar el aparato de retención que adquiere particular significancia morfológica y funcional en los niveles de las articulaciones de los dedos.

SISTEMA RETINACULAR ESTRUCTURAS

- El ligamento cutáneo de Cleland
- El ligamento retinacular lateral de Landsmeer
- La Faja fibrosa metacarpofalángica y el Capuchón Interóseo
- Ligamento retinacular dorsal con el ligamento triangular y fibras arciformes
- La fascia mediopalmar con sus dependencias:
 - el ligamento natatorio de Braune
 - las fibras terminales o distales de las bandas pretendinosas
 - septa vertical paratendinosa
 - ligamento metacarpiano transverso profundo
- Vainas fibrosas de los tendones flexores y el ligamento vaginal

• FORMACION FIBROAPONEUROTICAS DEDOS

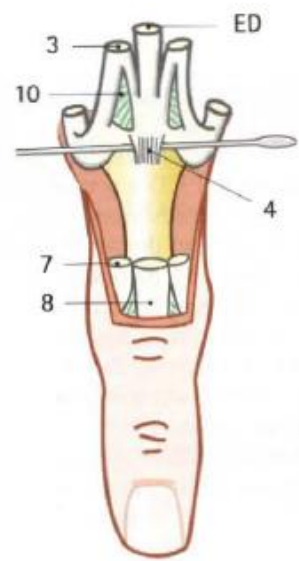


Fig. 86

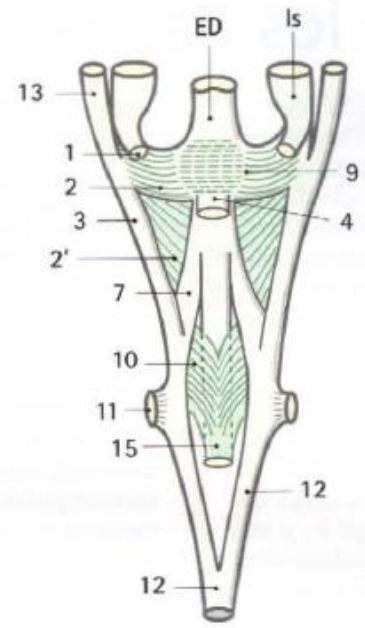


Fig. 87

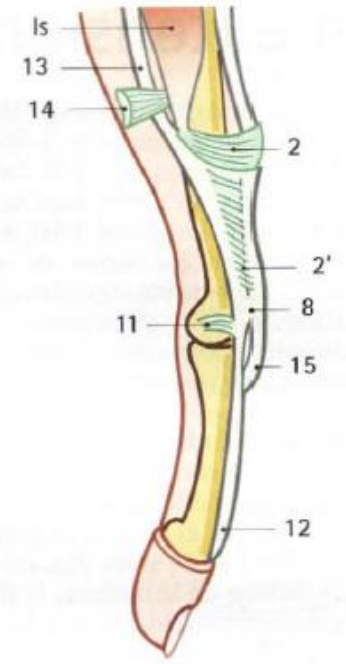
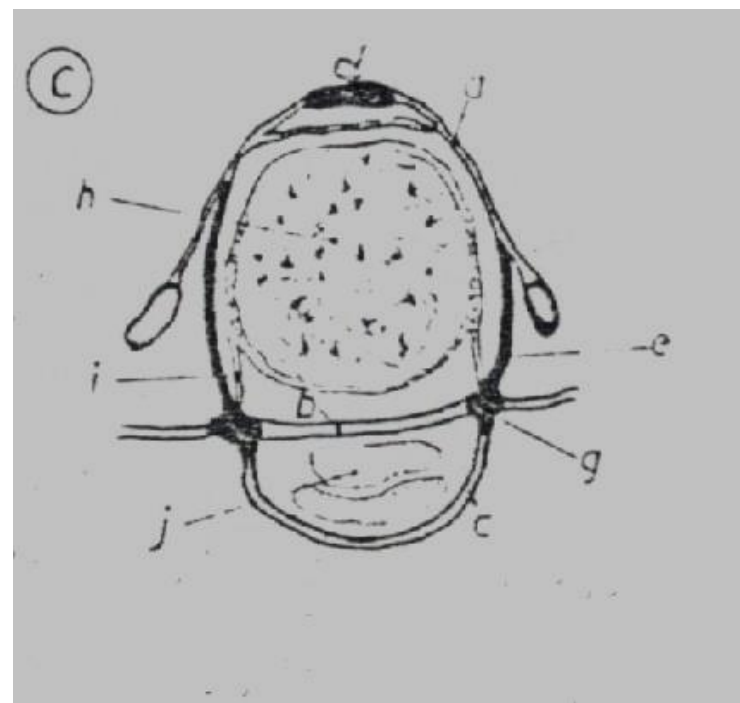
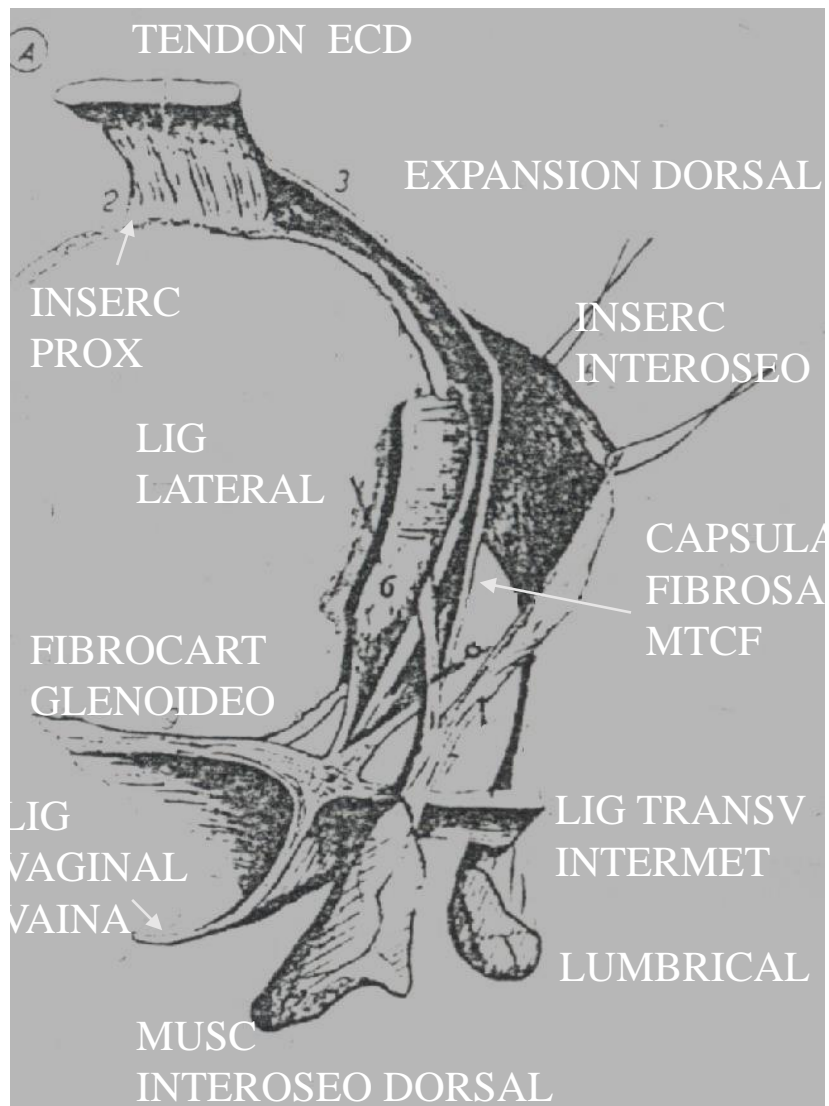


Fig. 88

NUCLEOS DE ENSAMBLE EN DEDOS



NUCLEOS DE ENSAMBLE Y APARATO DE RETENCIÓN

- NIVEL McF

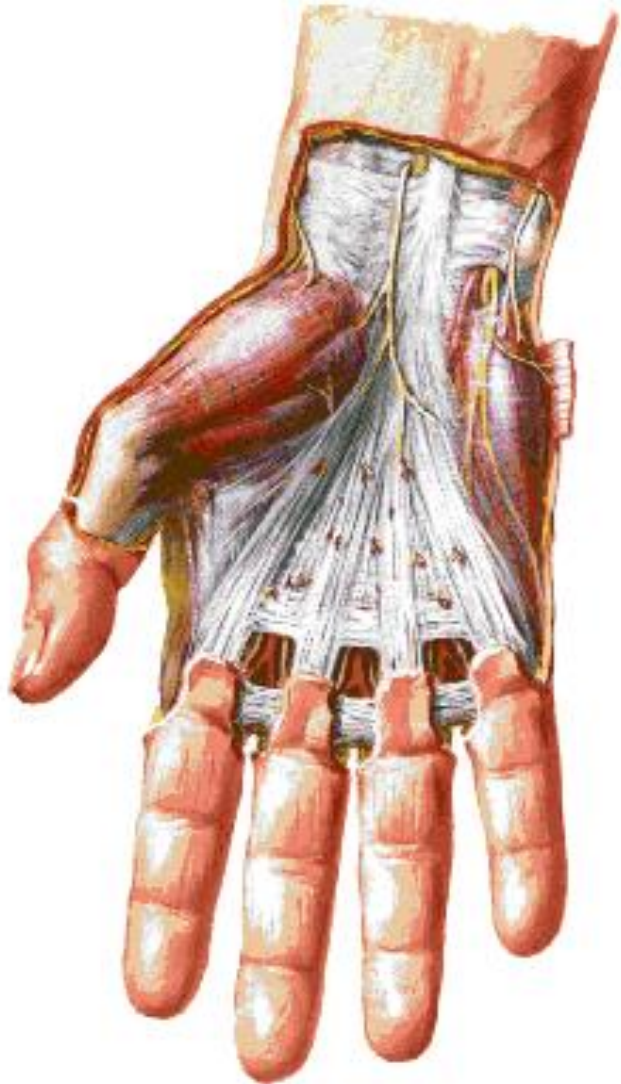
TRES PUENTES:

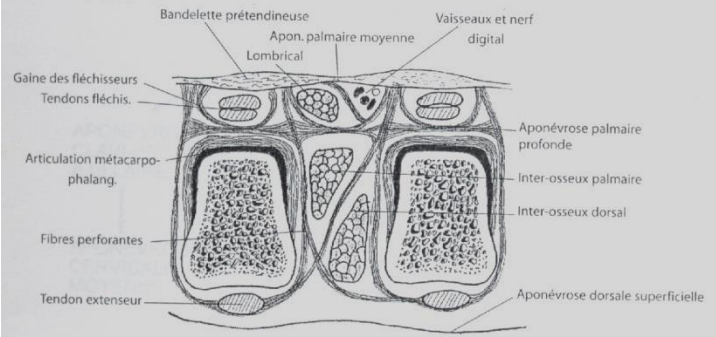
- DORSAL:
CAPUCHÓN INTEROSEO FAJA
FIBROSA McF
- MEDIAL:
FIBROART. GLENOIDEO
LIGAMENTO GLENOIDEO
- PALMAR:
LIGAMENTO VAGINAL

- NIVEL IF

- LIG. RETINACULAR DORSAL LIG.
TRIANGULAR FIBRAS
ARCIFORMES
- LIG. RETINACULAR LATERAL LÁMINA
OBLICUA CUERDA
LONGITUDINAL
- LIG. CUTÁNEO DE CLELAND

APONEUROSIS PALMAR Y DORSAL





1998

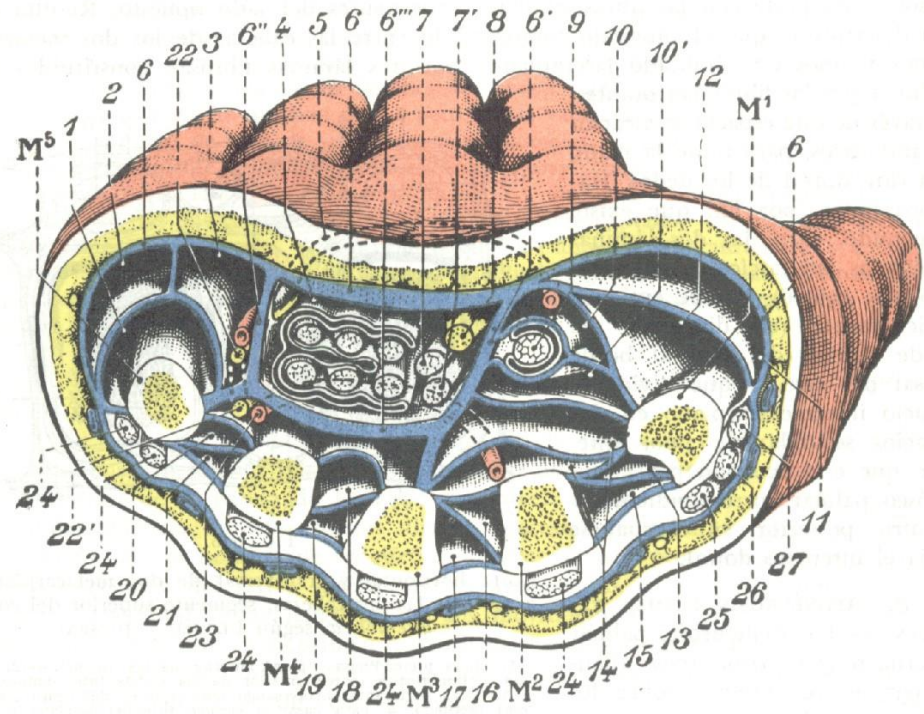
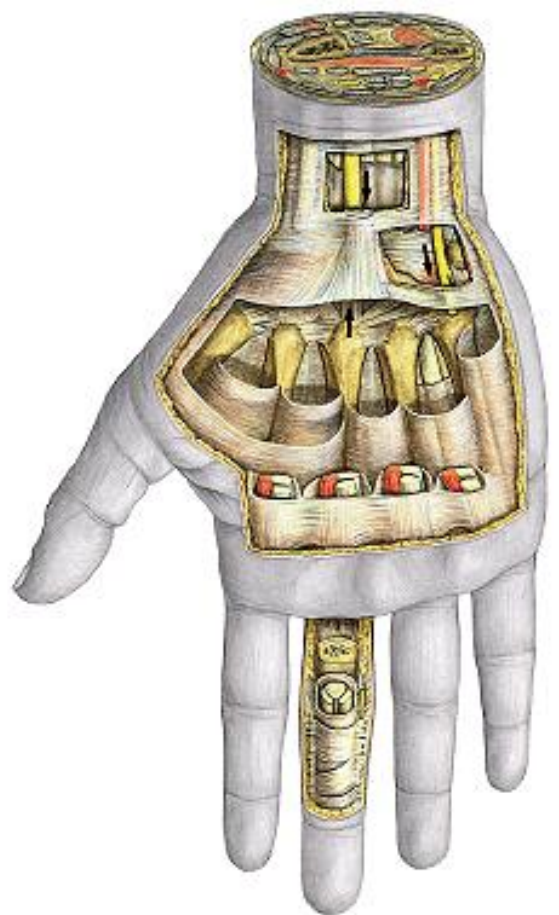
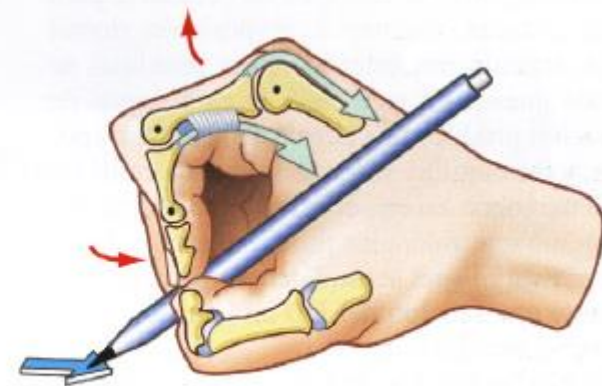
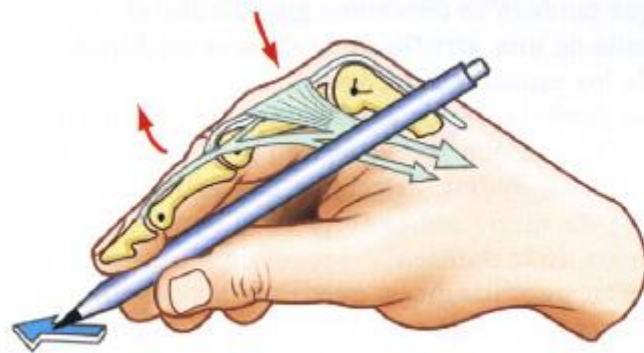
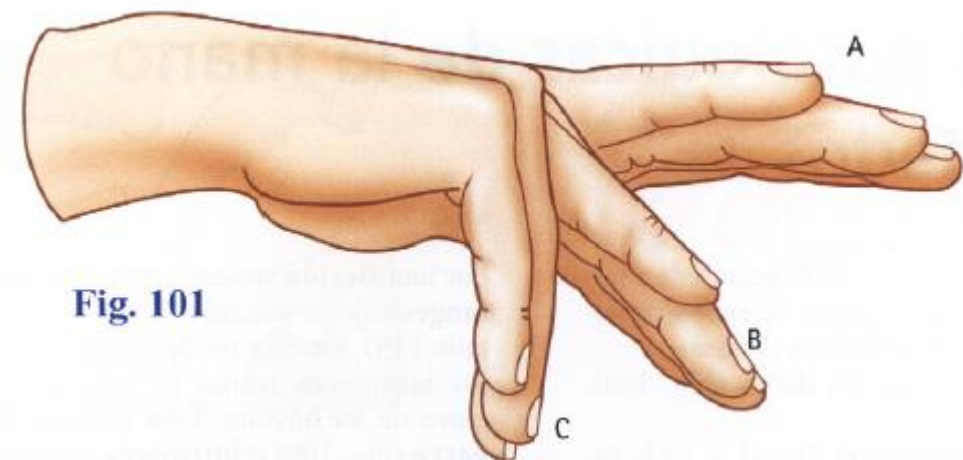


FIG. 997



CIRCUITOS FUNCIONALES SINERGIA INTEROSEOS Y LUMBRICALES



COORDINACION FLEXO EXTENSION CIRCUITOS DIGITALES

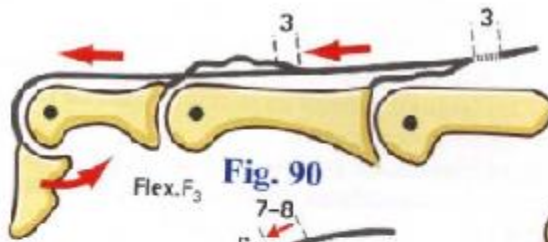


Fig. 90

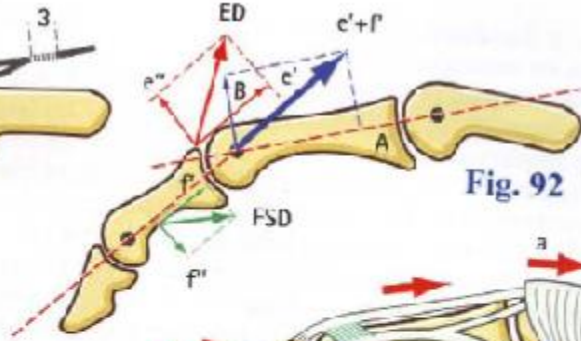


Fig. 92

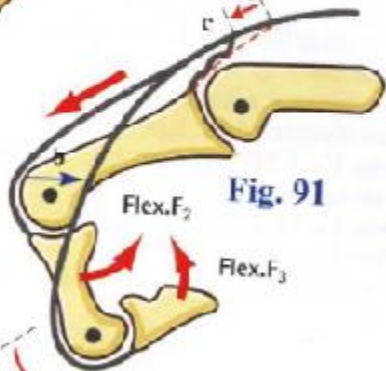


Fig. 91

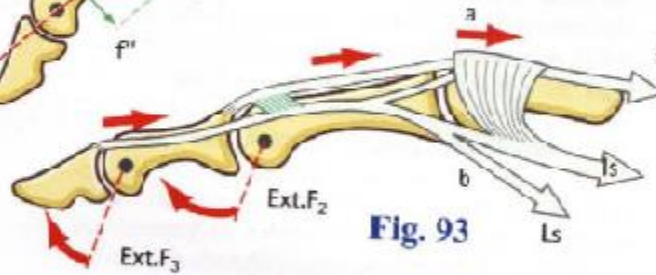


Fig. 93

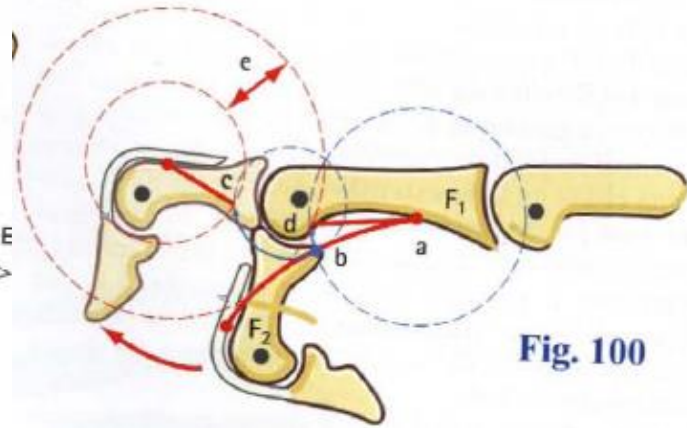


Fig. 100

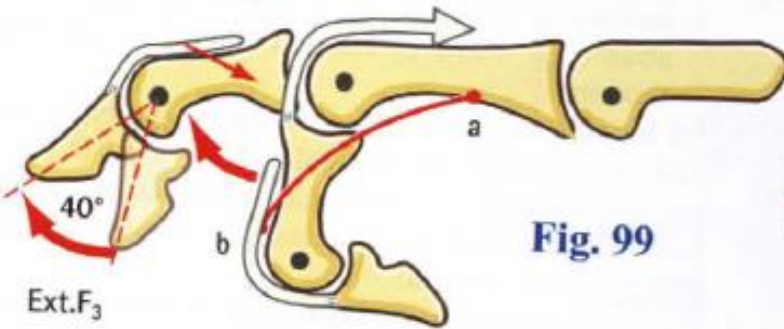


Fig. 99

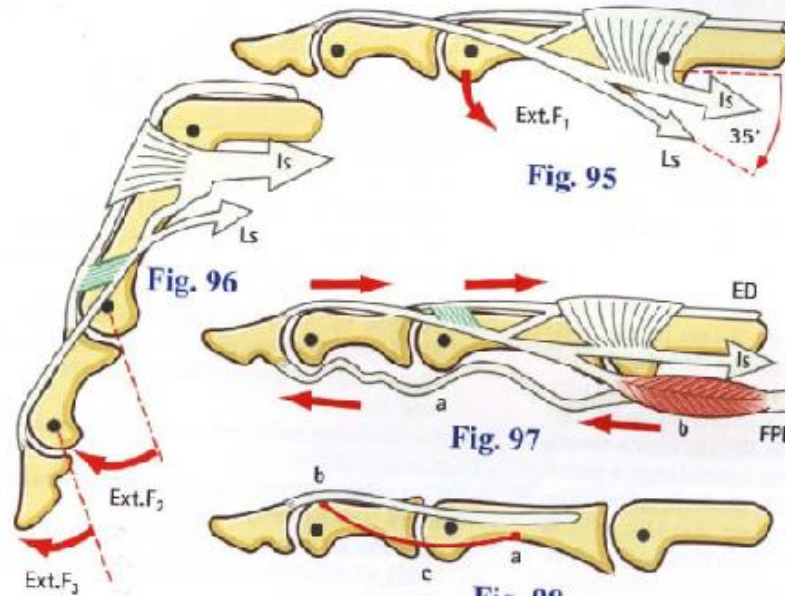


Fig. 95

Fig. 96

Fig. 97

Fig. 98

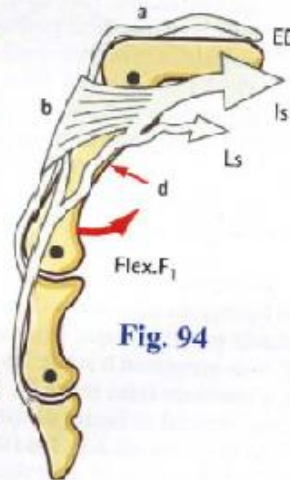


Fig. 94

CIRCUITO FUNCIONAL DE LOS DEDOS FLEXIÓN DIGITAL COMPLETA

MODIFICACIONES ESTRUCTURALES

- NIVEL McF:

DESLIZAMIENTO DISTAL DE:

- * BANDA INTERTENDINOSA
- * CAPUCHÓN INTEROSEO
- * FAJA FIBROSA McF

EXPANSIÓN CENTRAL PROFUNDA DEL TENDÓN EXTENSOR

*

- NIVEL IF:

DESLIZAMIENTO DISTAL DEL TENDÓN CONJUNTO PROXIMAL

DESPLAZAMIENTO DISTAL Y ANTEROLATERAL DEL TENDÓN CONJUNTO LATERAL

CIRCUITOS FUNCIONALES DE LOS DEDOS FLEXIÓN SIMULTÁNEA Y ASOCIADA

- CIRCUITO PROXIMAL:

- * APARATO EXTENSOR: TENDÓN CONJUNTO PROXIMAL
TENDÓN CONJUNTO DISTAL
BANDAS LATERALES INTRÍNSECAS
- * LUMBRICALES E INTEROSEOS
- * TENDONES FLEXORES DE LOS DEDOS

- CIRCUITO DISTAL:

- * FLEXOR PROFUNDO DE LOS DEDOS
- * FALANGE DISTAL
- * TENDÓN EXTENSOR CONJUNTO DISTAL
- * CUERDAS LONGITUDINALES DEL LIG. RETINACULAR LATERAL

CIRCUITOS FUNCIONALES DE LOS DEDOS

EXTENSIÓN DIGITAL COMPLETA

MODIFICACIONES ESTRUCTURALES

- NIVEL McF:

MIGRACIÓN PROXIMAL DE: * TENDONES EXTENSORES
 * BANDA INTERTENDINOSA
 * FAJA FIBROSA McF
 * CAPUCHÓN INTEROSEO
 * EXPANSIÓN CENTRAL PROF.

- NIVEL IF:

MIGRACIÓN PROXIMAL TENDÓN EXTENSOR CONJUNTO PROXIMAL
DESPLAZAMIENTO PROXIMAL Y DORSOMEDIAL DEL TENDÓN
EXTENSOR CONJUNTO LATERAL

CIRCUITOS FUNCIONALES DE LOS DEDOS

EXTENSIÓN SIMULTÁNEA

- CIRCUITO PROXIMAL:

- * APARATO EXTENSOR: FAJA FIBROSA McF
CAPUCHÓN INTEROSEO
LÁMINA TRIANGULAR INTEROSEA
EXPANSIÓN CENTRAL PROFUNDA

- CIRCUITO DISTAL:

- TENDÓN EXTENSOR PROXIMAL
TENDONES CONJUNTOS LATERALES
BANDAS LATERALES INTRÍNSECAS

