

CLAVOS CERROJADOS ACERROJADOS ENCERROJADOS

GEVO BILBAO 2002-2022

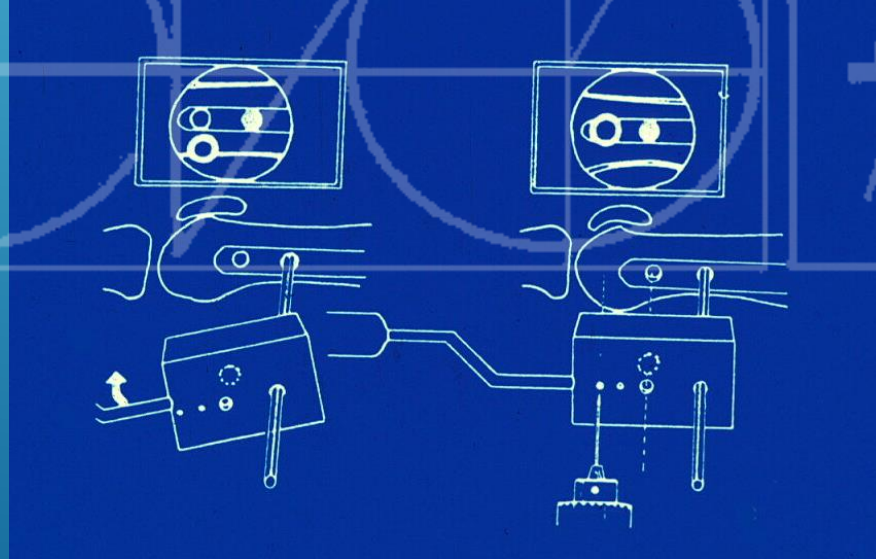
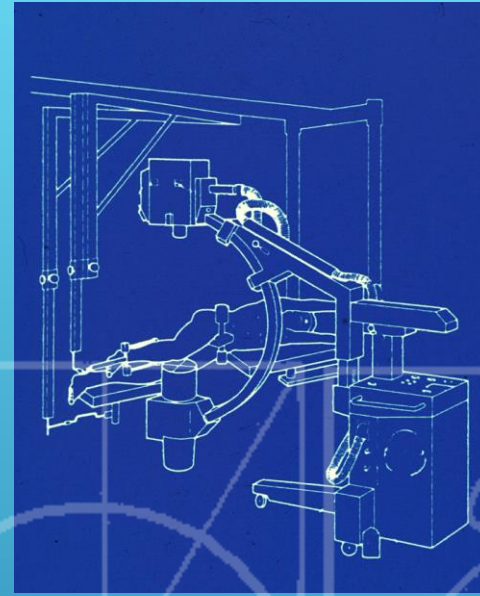
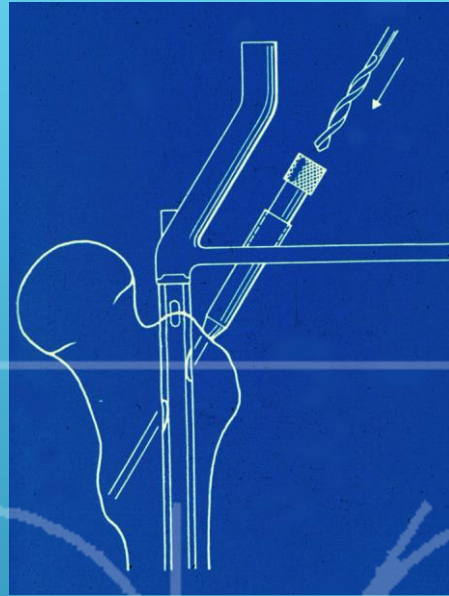
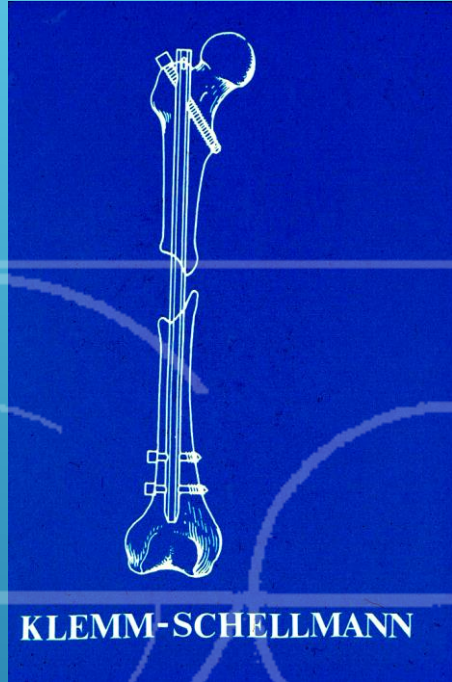
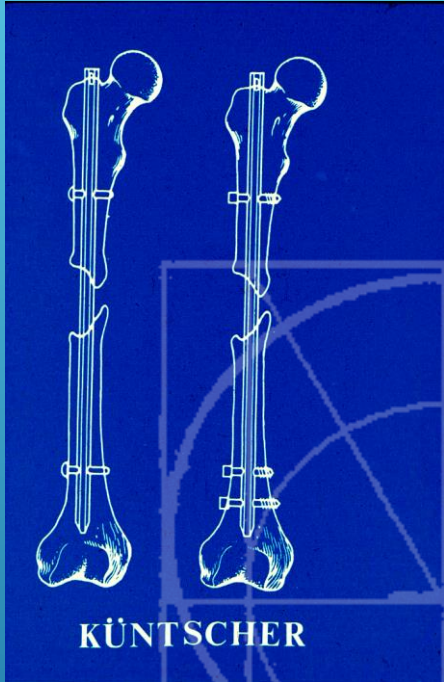
Ignacio Durall

Carmen Díaz-Bertrana

Universidad Autónoma Barcelona

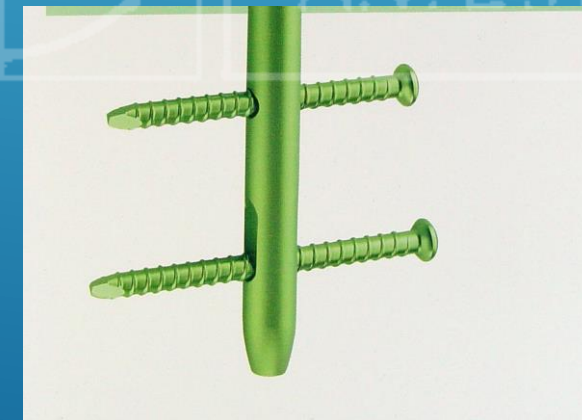
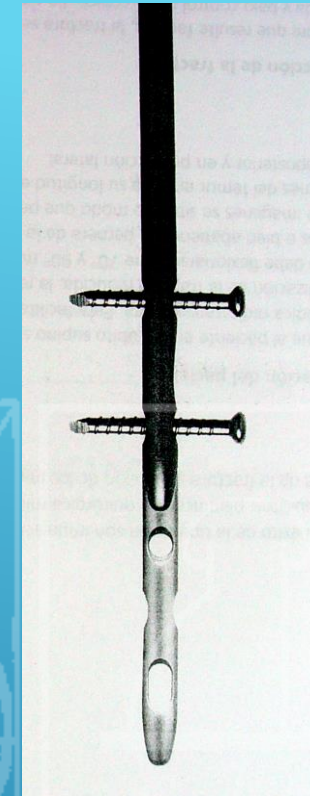


HISTORIA

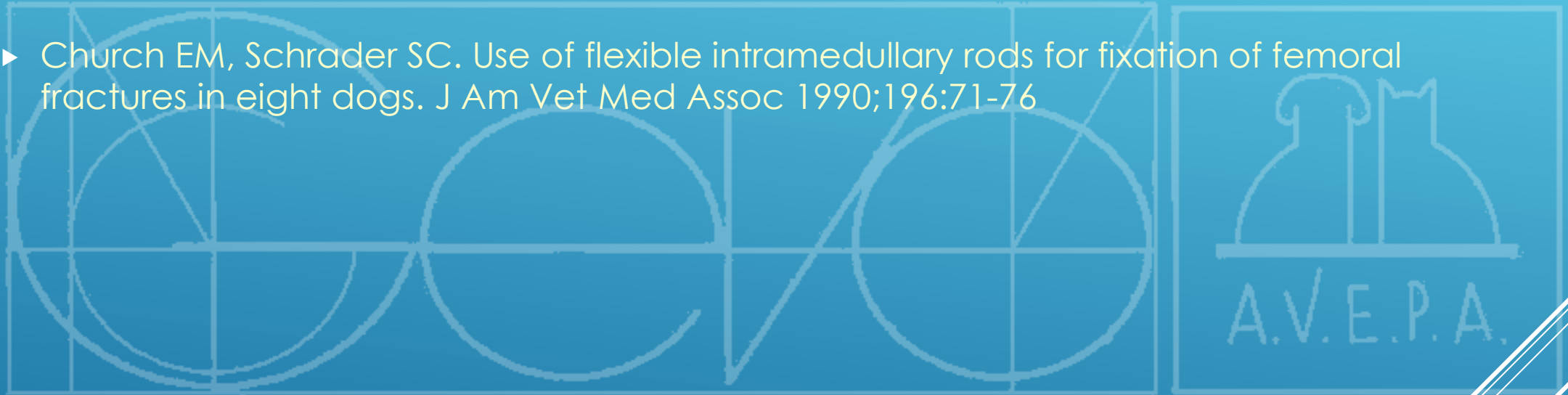


CLAVOS CERROJADOS EN MEDICINA HUMANA

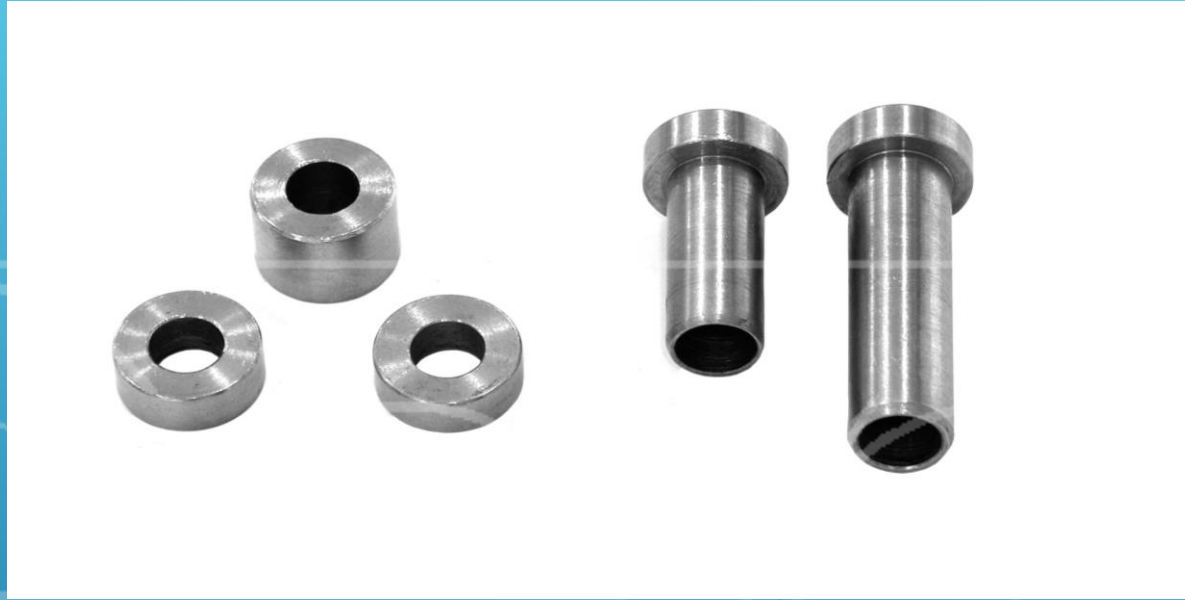
- ▶ Küntscher Derby
- ▶ Ender Ortofix
- ▶ Fernandez Seidel
- ▶ Biomet Polarus
- ▶ IMSC AO-ASIF:
- ▶ Medinov
- ▶ BIO - Femoral sólido UFN
- ▶ Vari-wall - Femoral proximal PFN
- ▶ IC - Femoral distal DFN
- ▶ Huckstep - Tibial sólido UTN
- ▶ Grosse-Kempf - Tibial canulado CTN
- ▶ Rusell-Taylor - Humeral flexible
- ▶ Brooker-Wills
- ▶ William
- ▶ Gamma
- ▶ Klemm-Schellmann



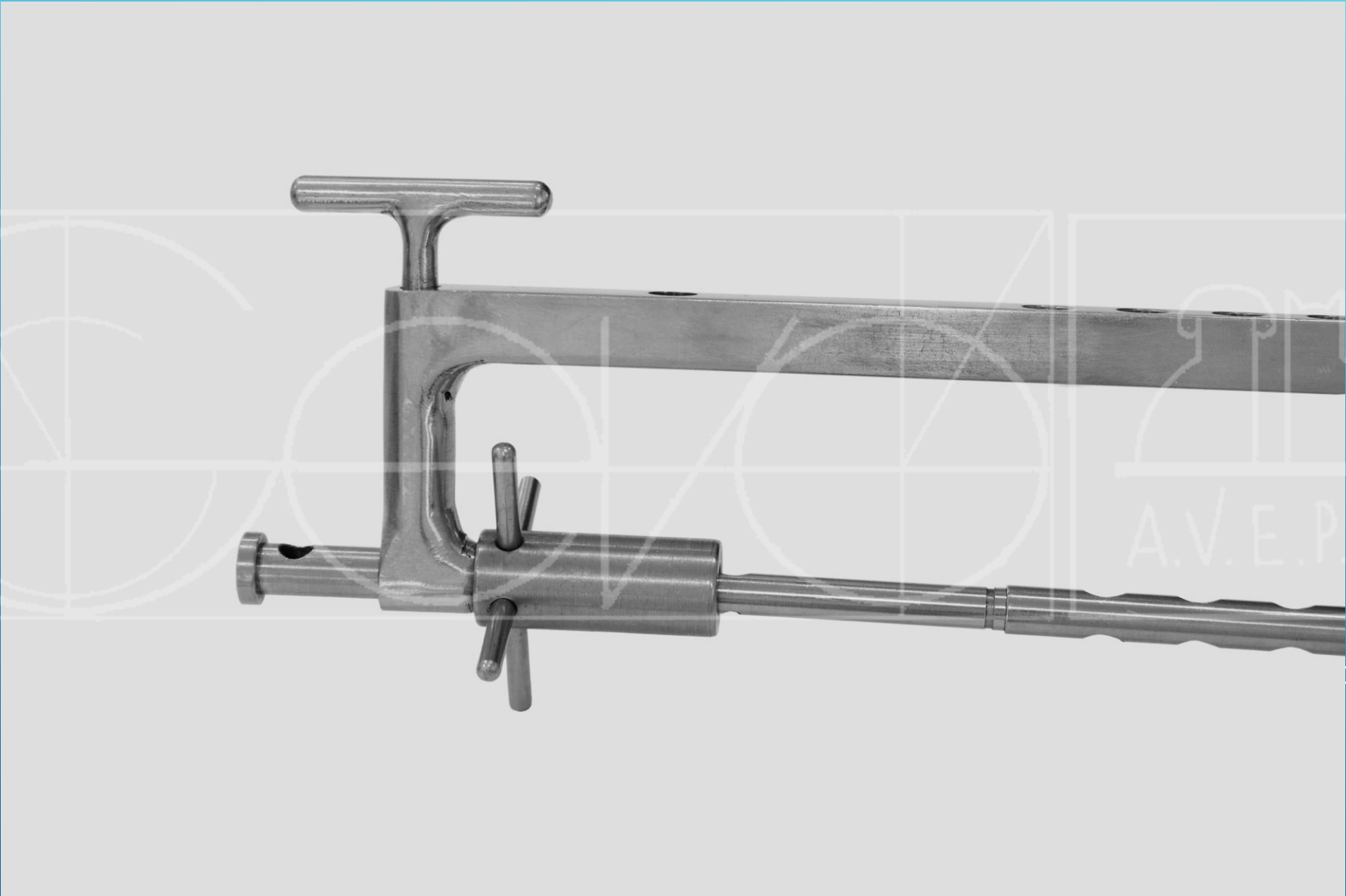
- ▶ Church EM, Schrader SC. Use of flexible intramedullary rods for fixation of femoral fractures in eight dogs. J Am Vet Med Assoc 1990;196:71-76



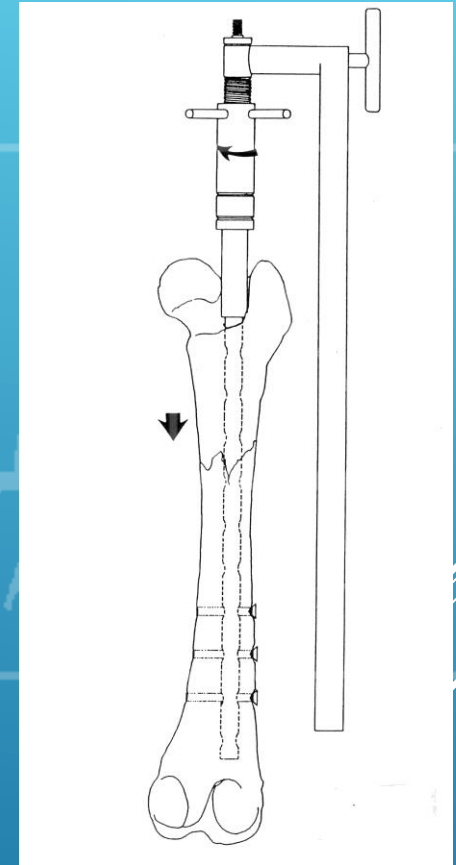
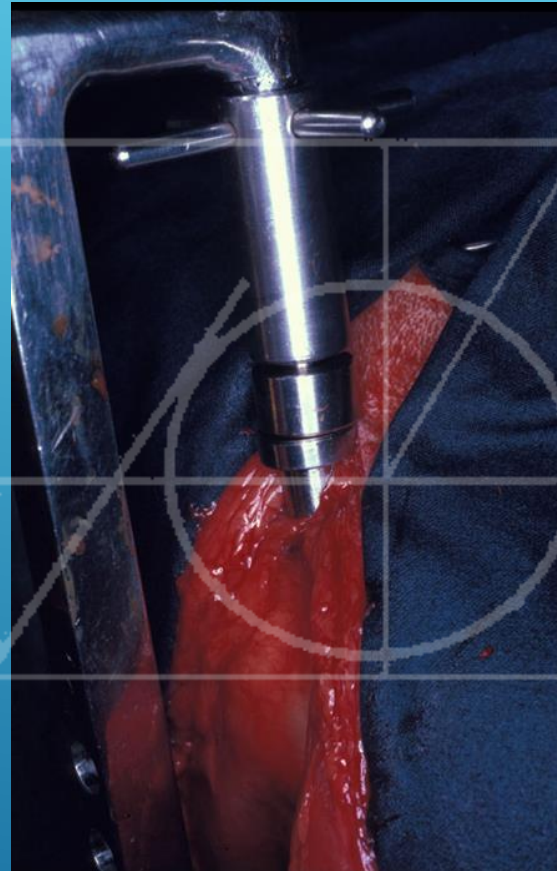
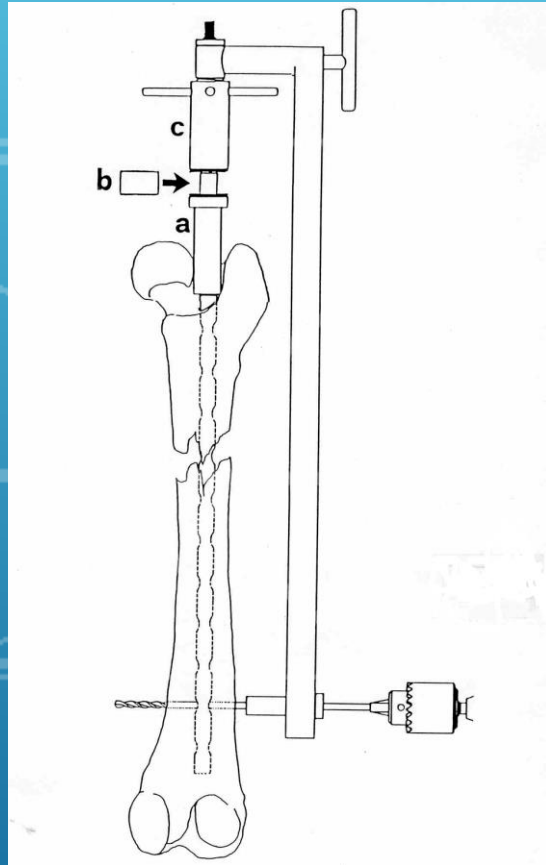
COMPRESIÓN DE LAS FRACTURAS DIAFISARIAS DE FÉMUR MEDIANTE IN CLAVO INTRAMEDULAR



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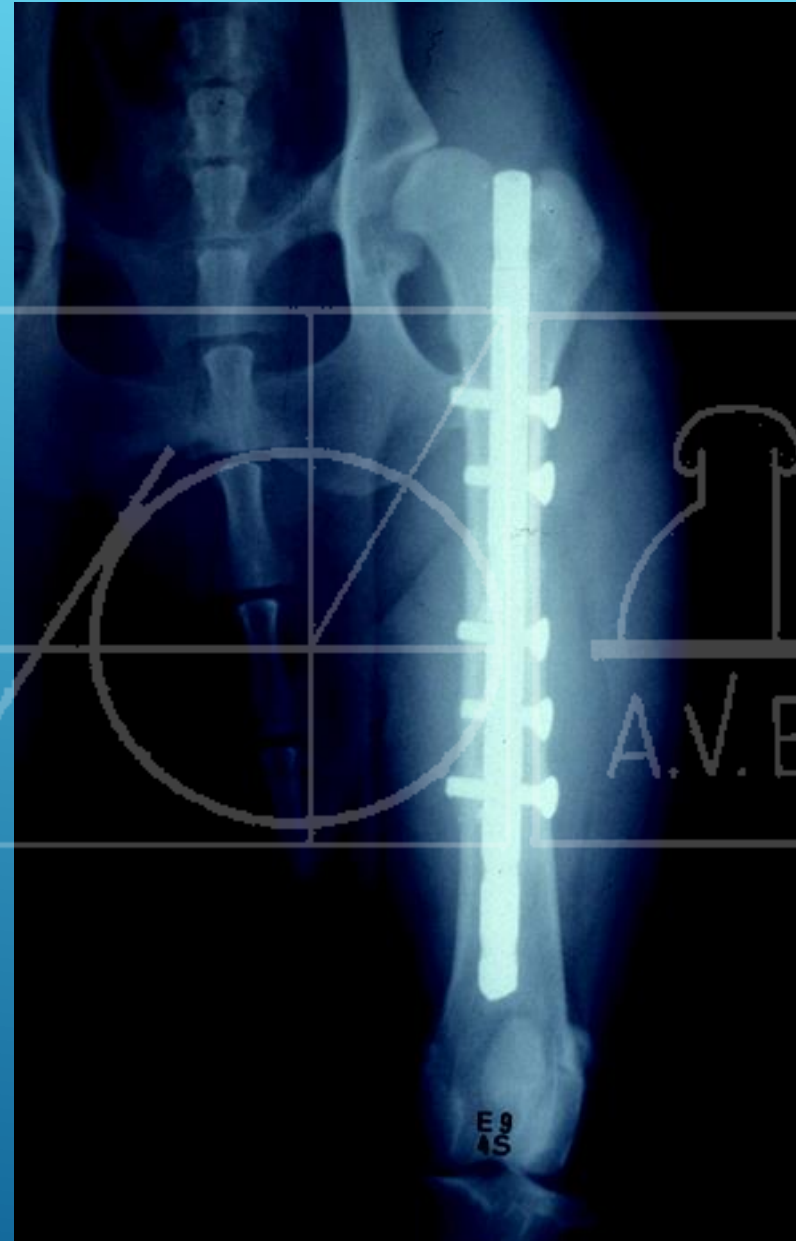
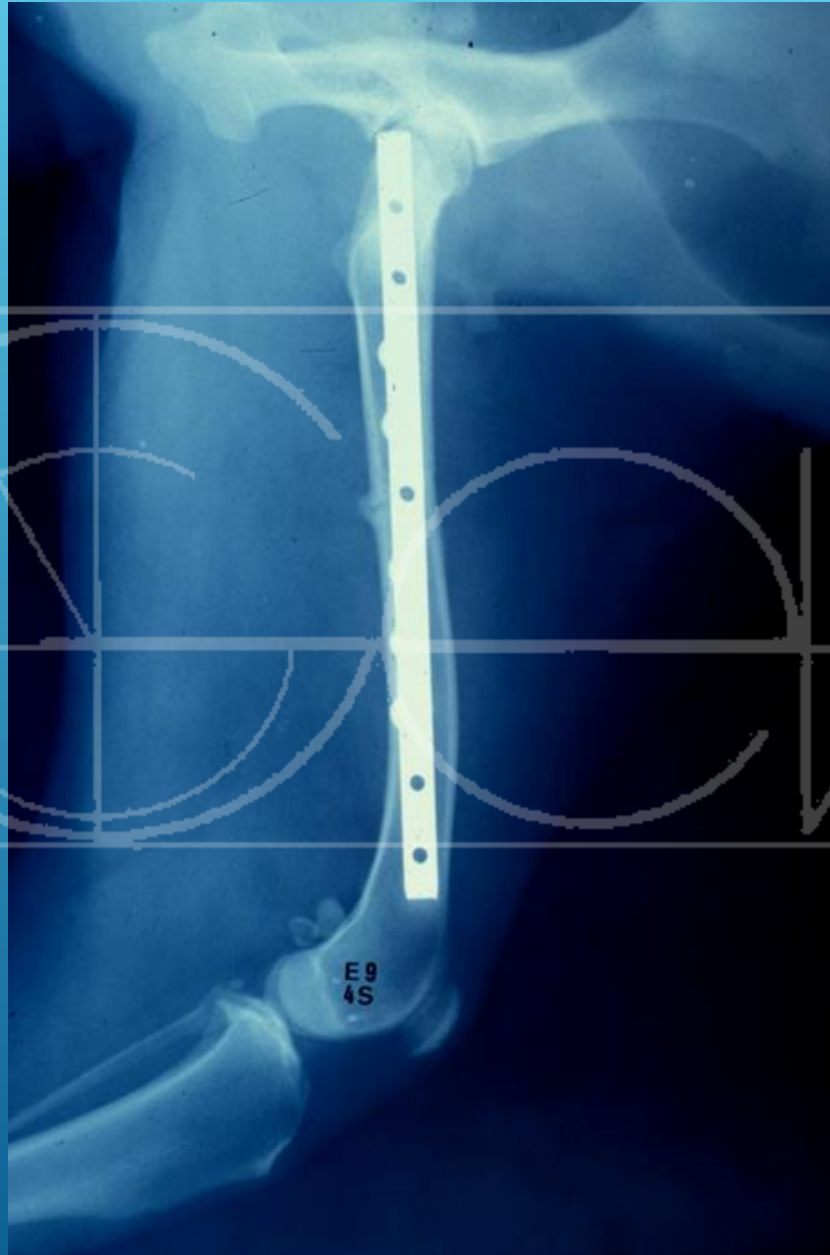
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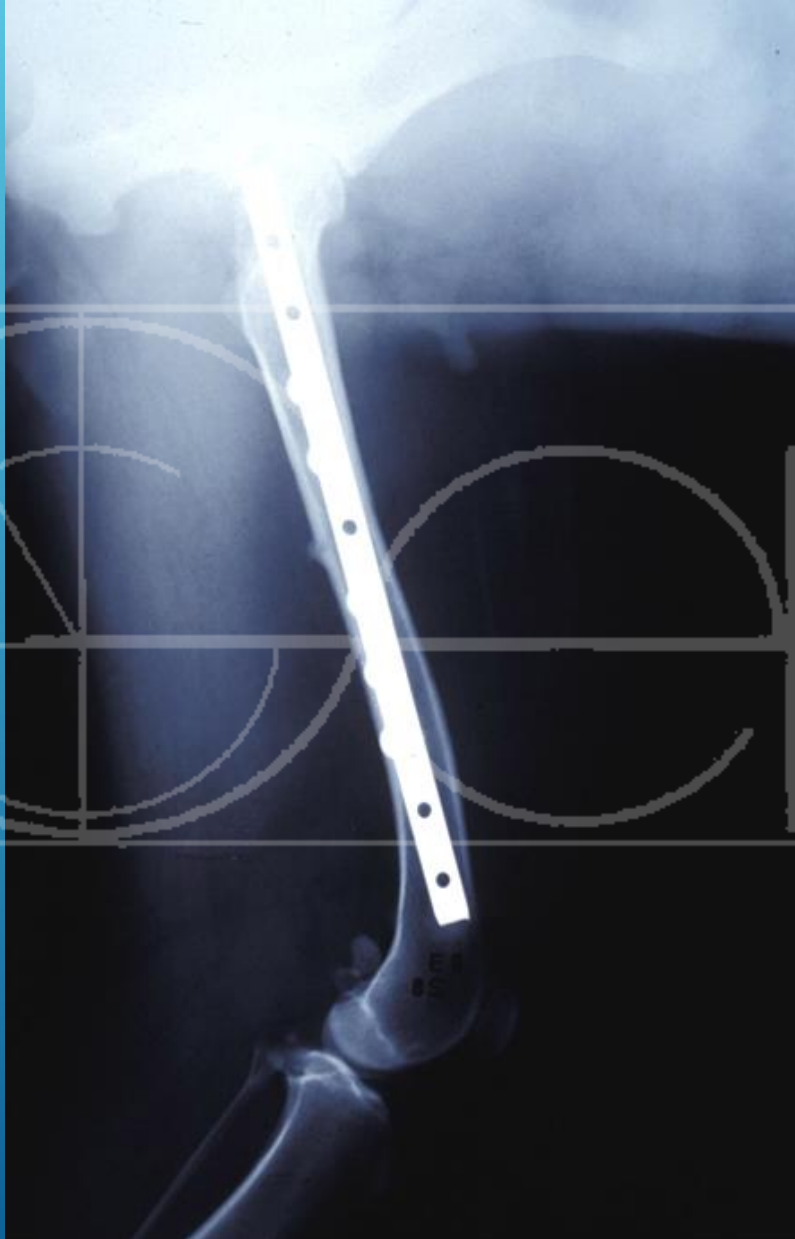
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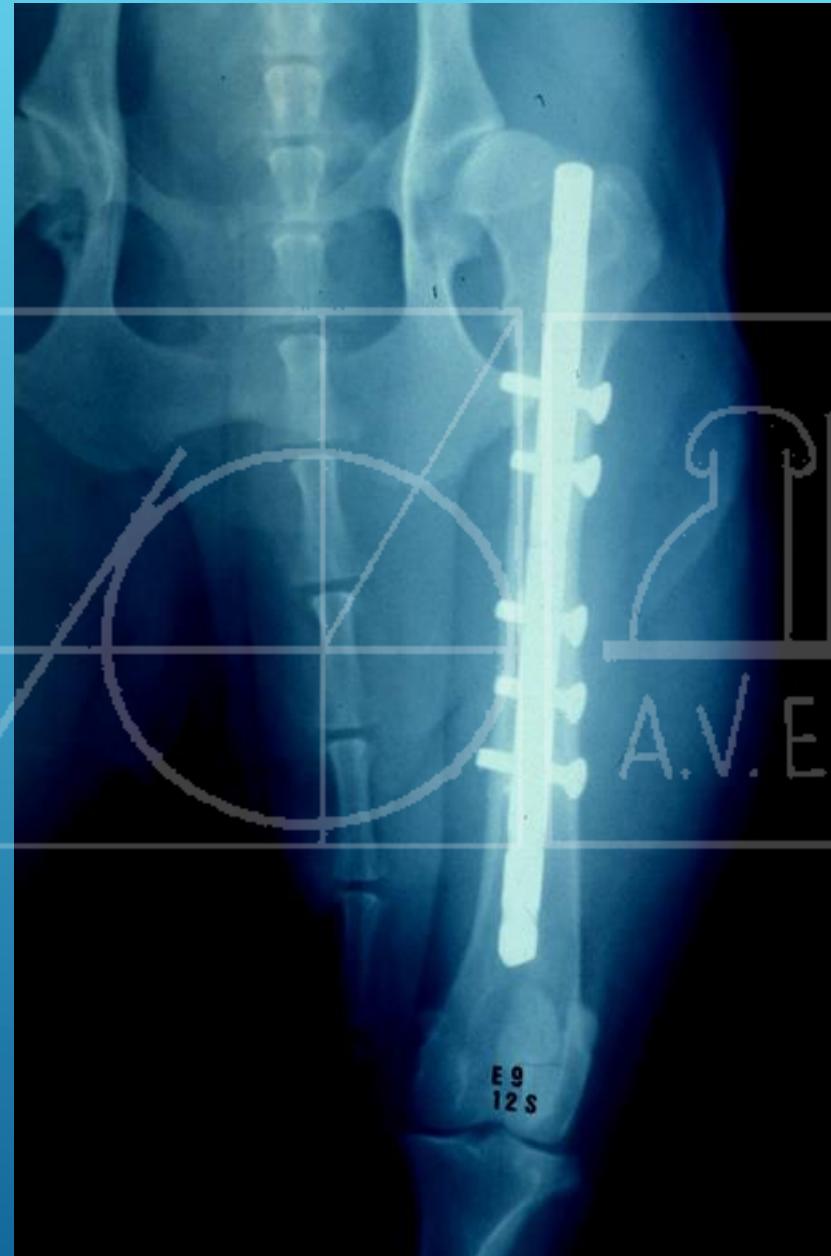
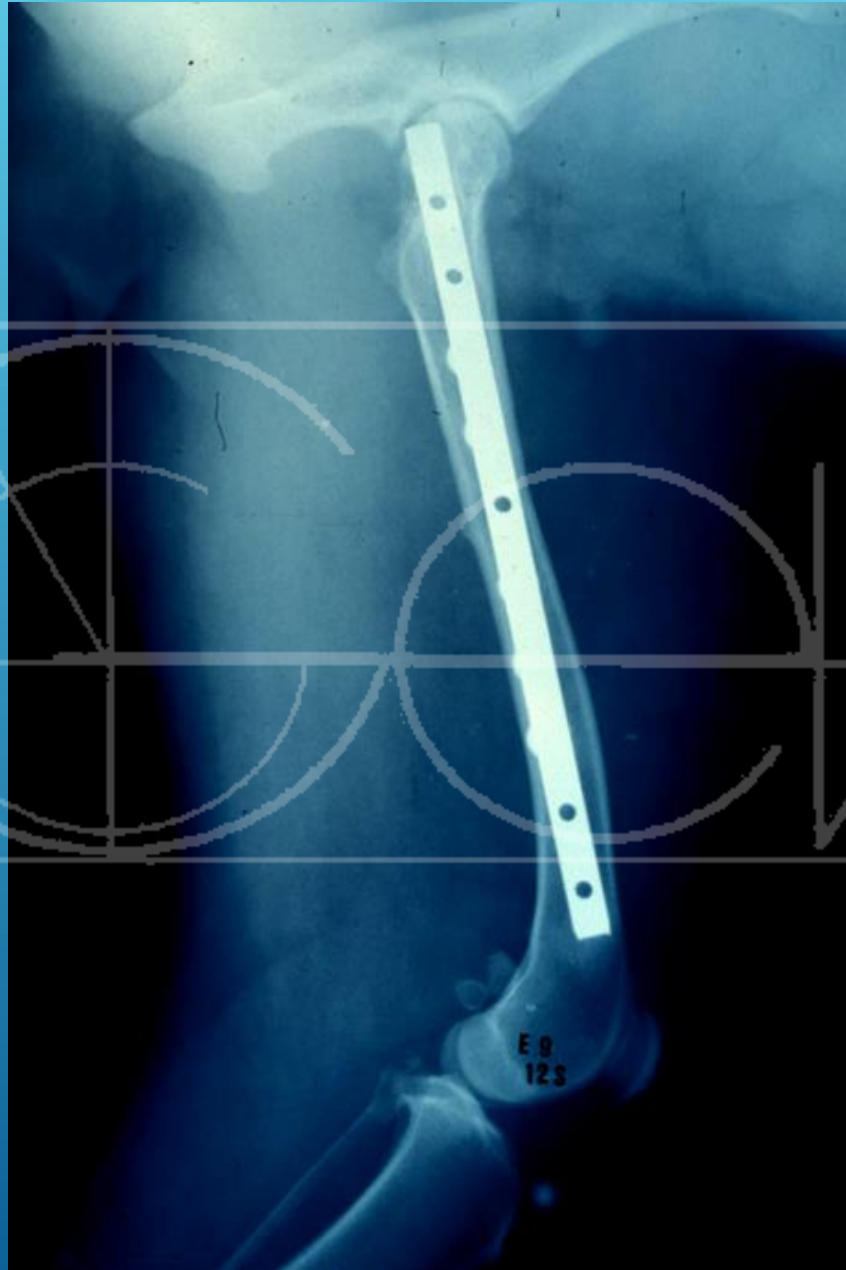
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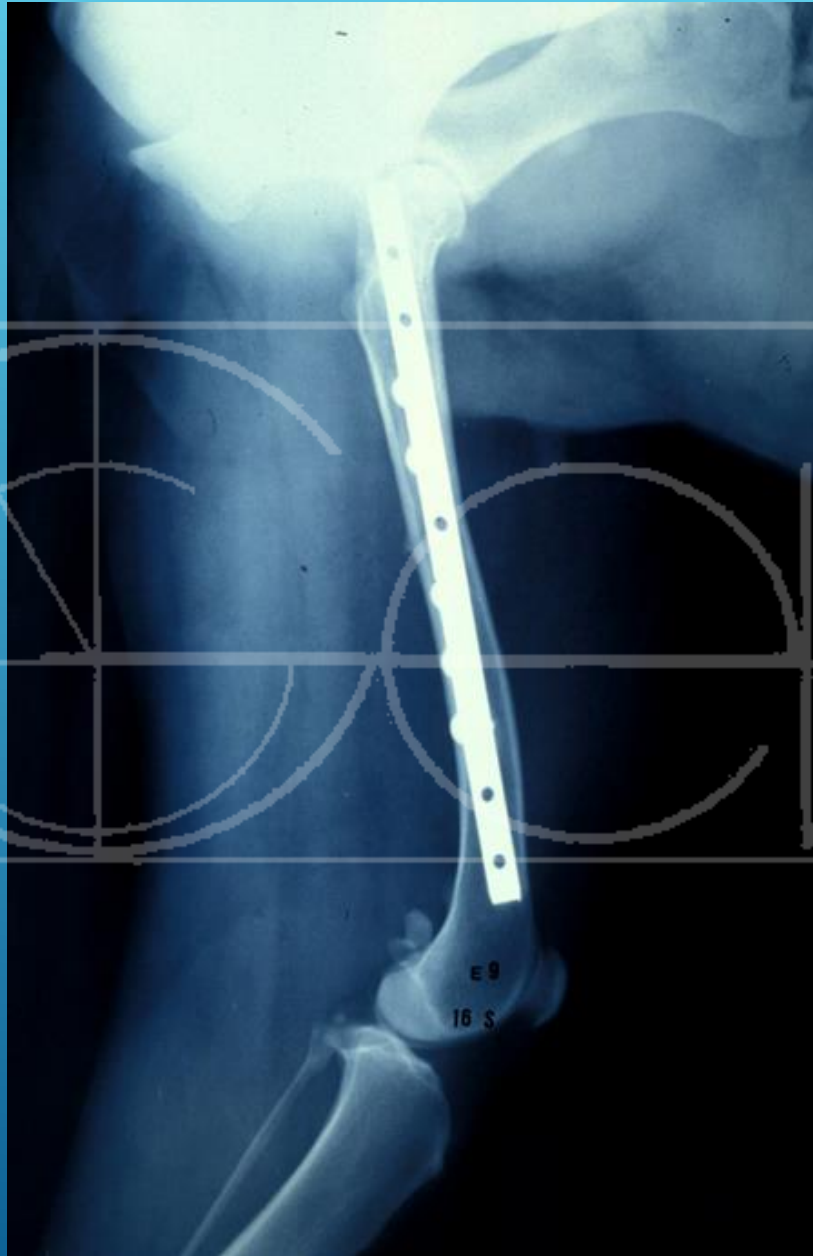


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A.V.E.P.A.

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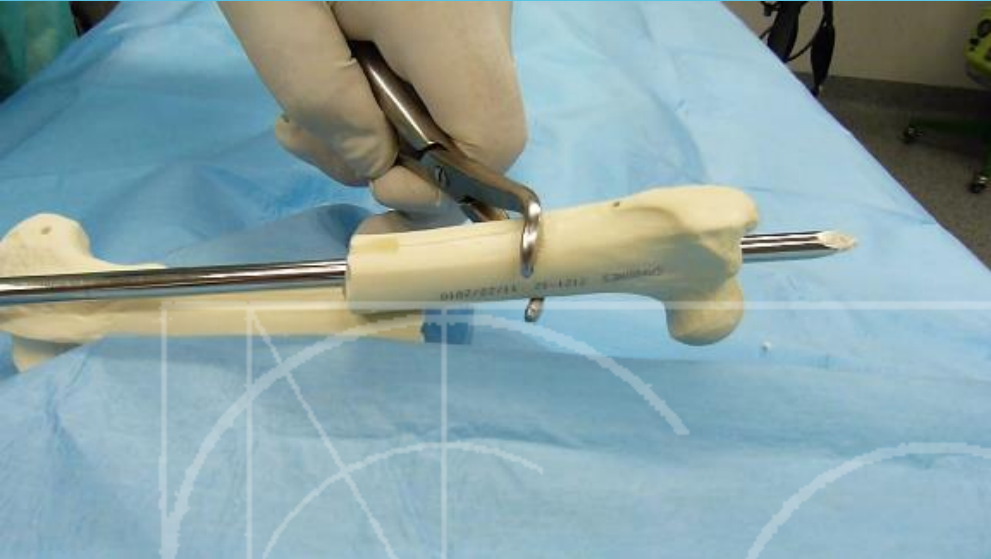
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- ▶ Durall I, Díaz MC, Morales I. Fracture compression by intramedullary Pin ¿A new fracture treatment in veterinary surgery? BSAVA, Birmingham, 1992
- ▶ Durall I, Díaz MC, Morales I: An Experimental Study of Compression of Femoral Fractures by an Interlocking Intramedullary Pin. Veterinary and Comparative Orthopedic and Trauma 6:93- 99, 1993



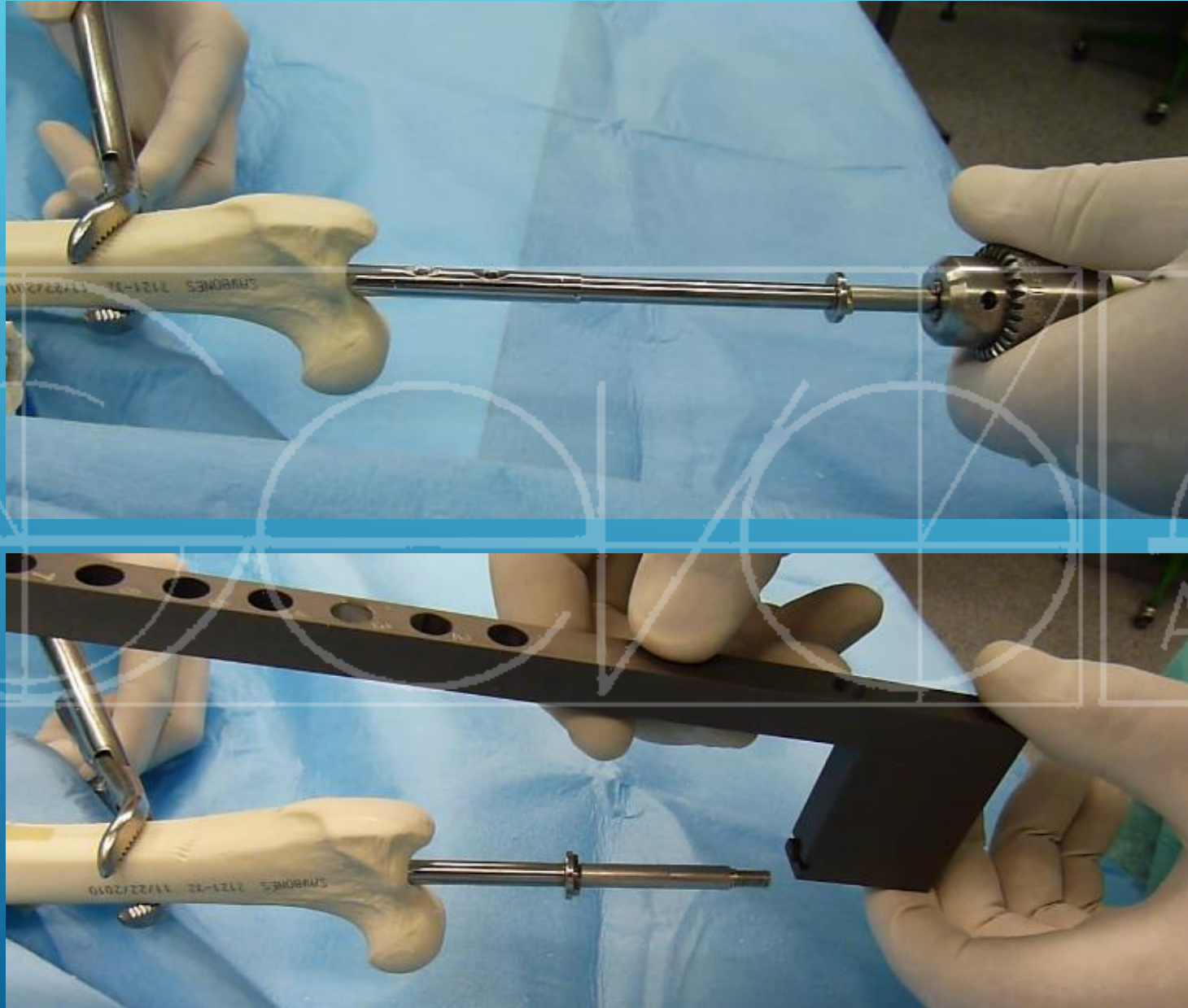
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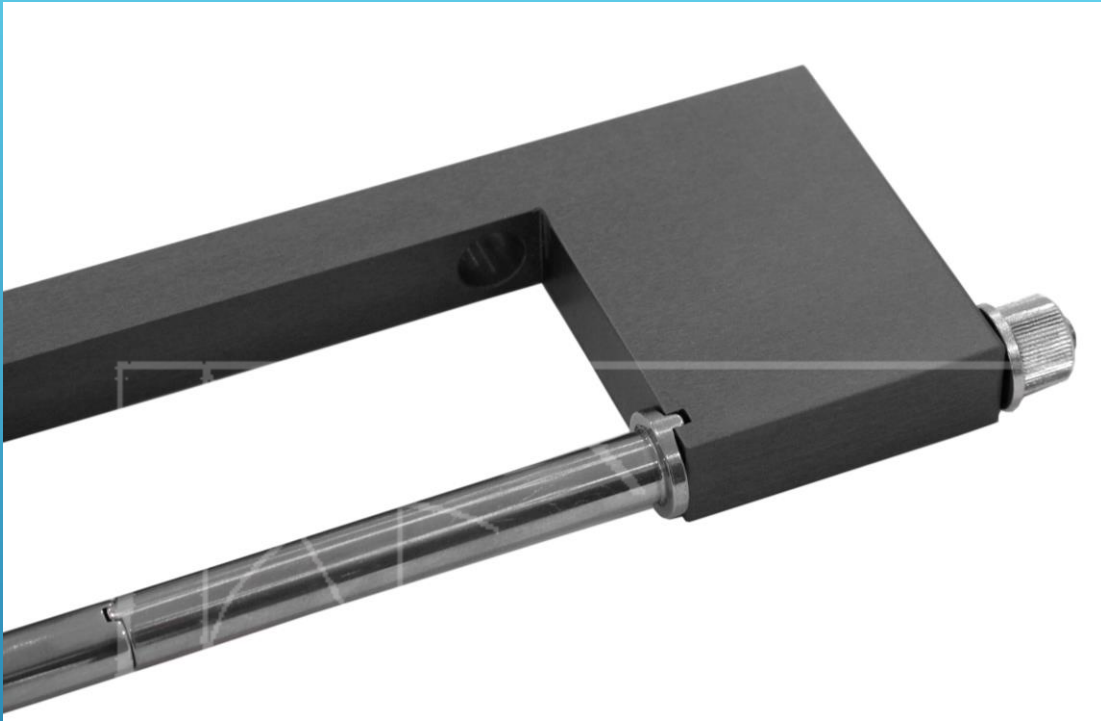
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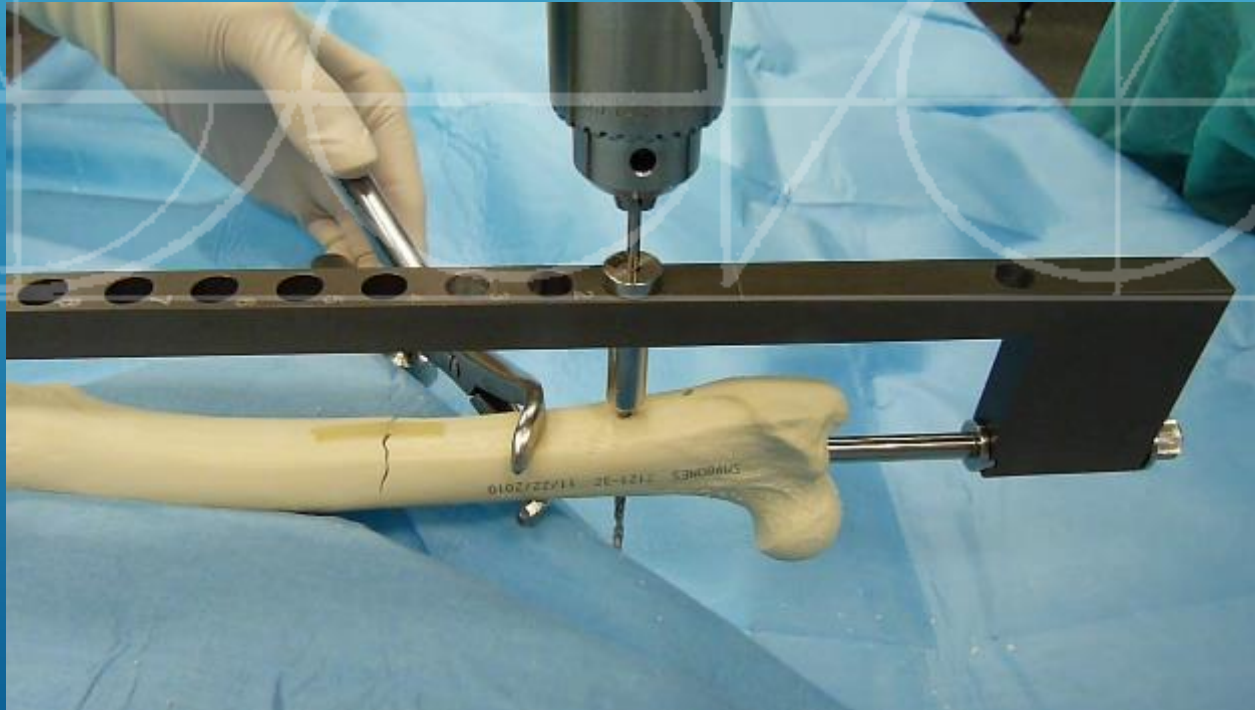
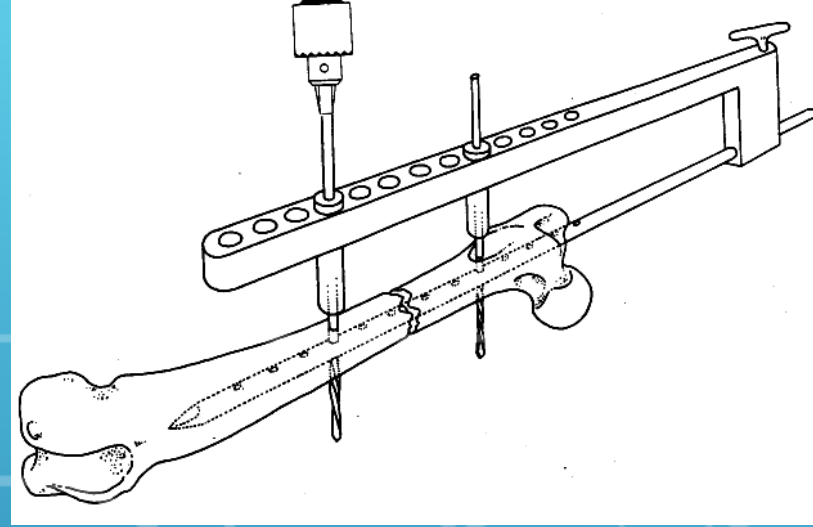
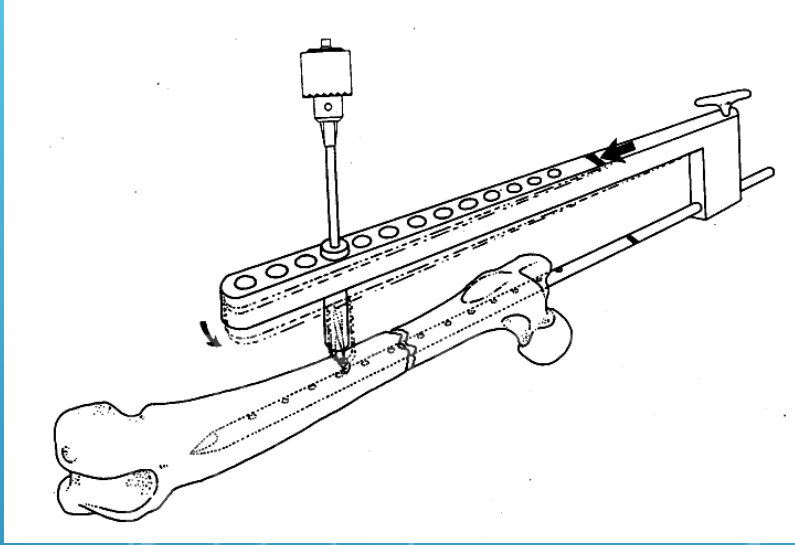
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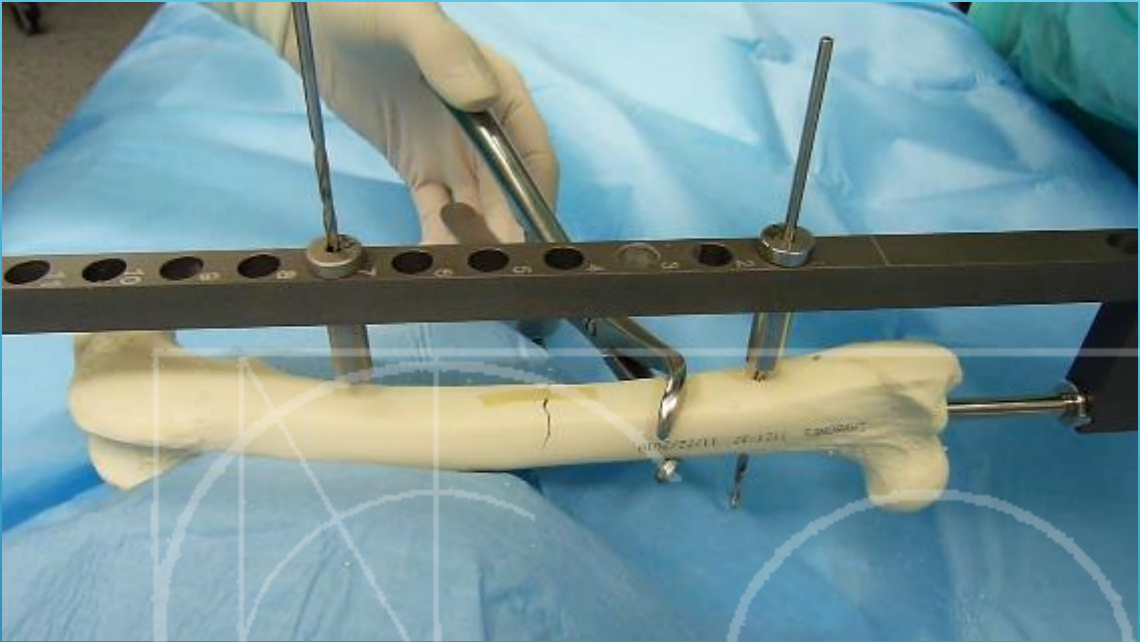
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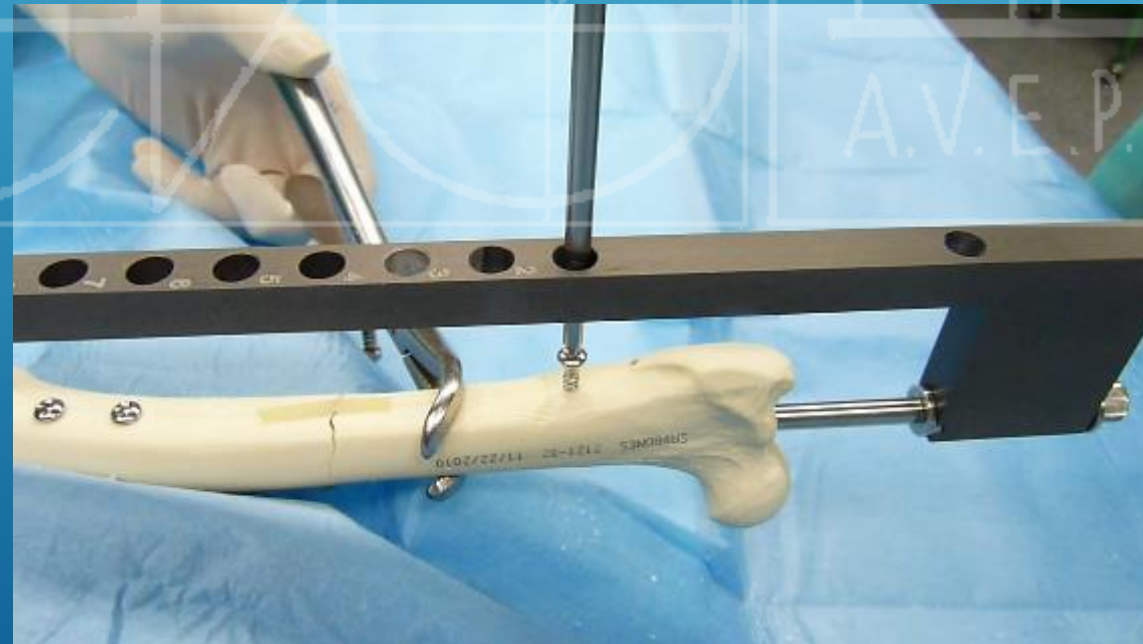
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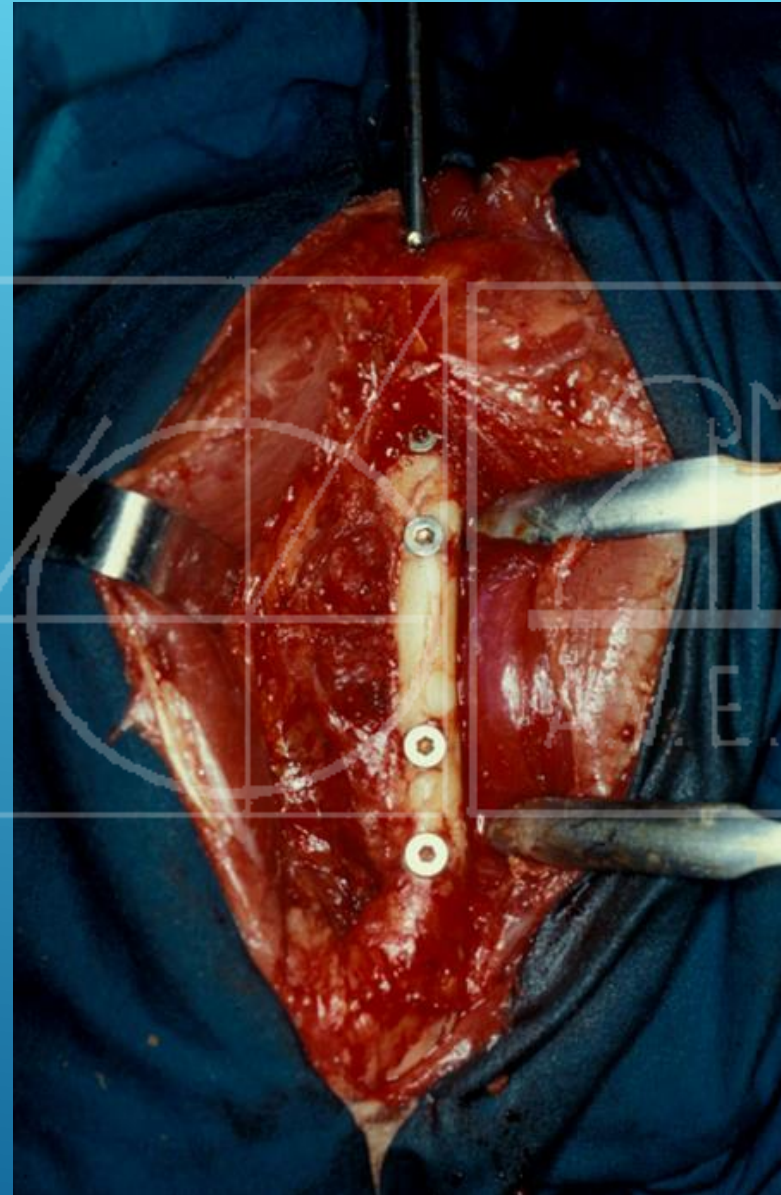
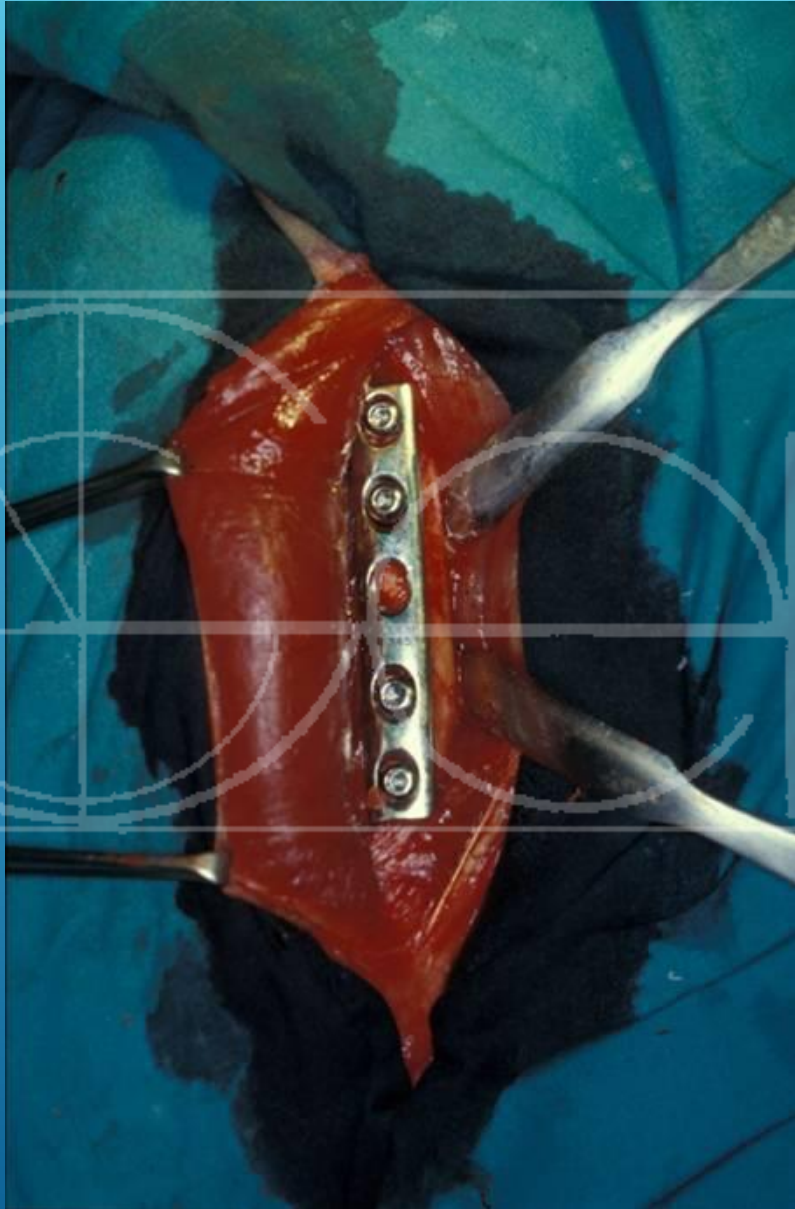


A.V.E.P.A.

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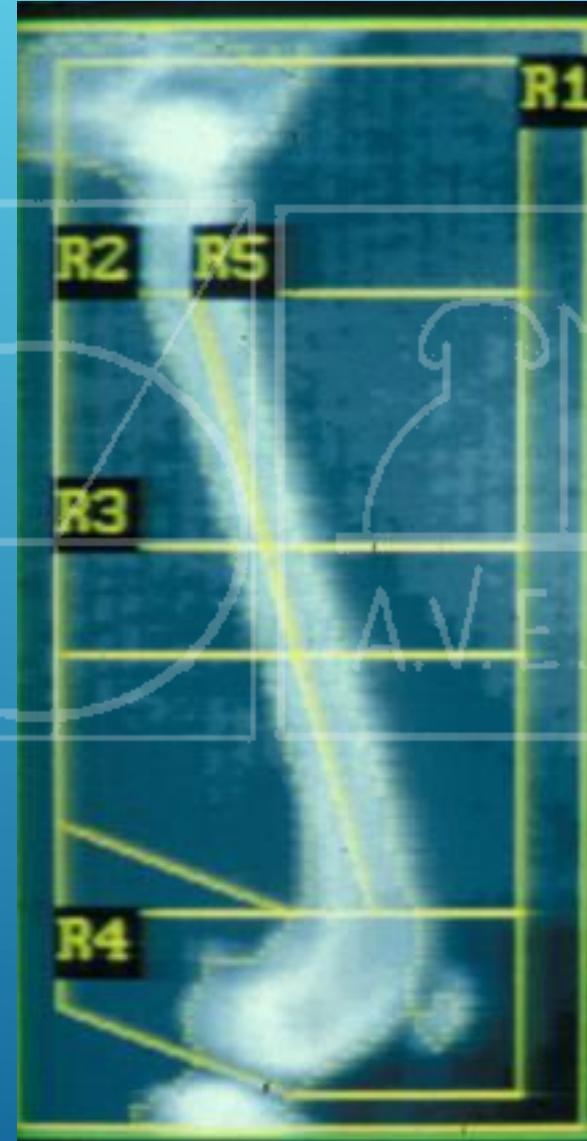


EVOLUCIÓN DE LA MASA ÓSEA EN EL FÉMUR CANINO SOMETIDO A FIJACIÓN INTERNA
CON PLACAS DE COMPRESIÓN DINÁMICA Y CLAVOS CERROJADOS

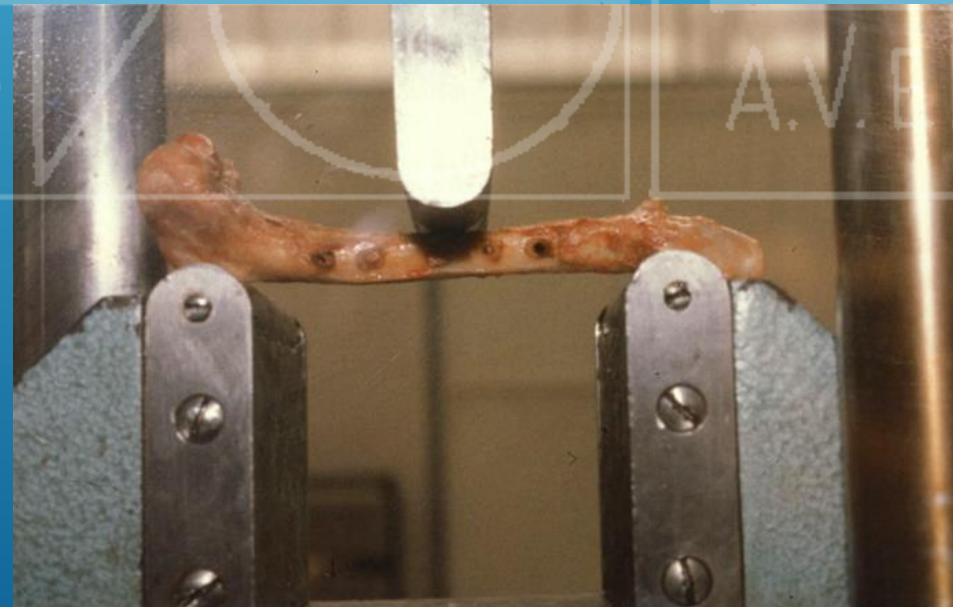
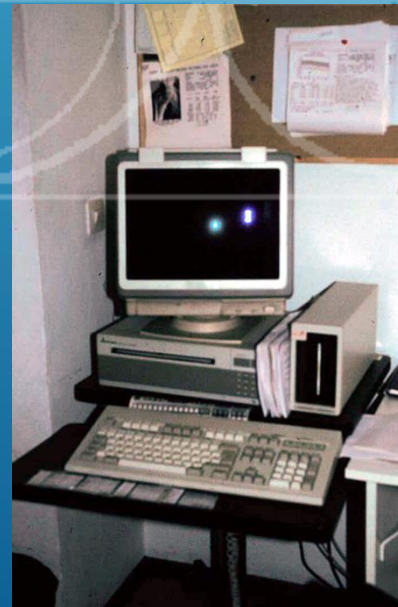
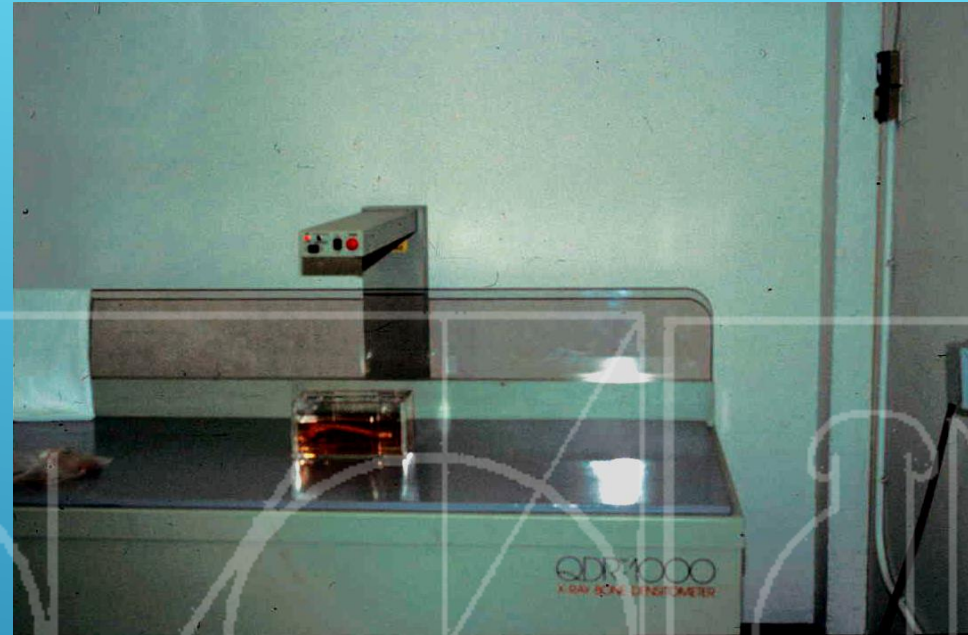


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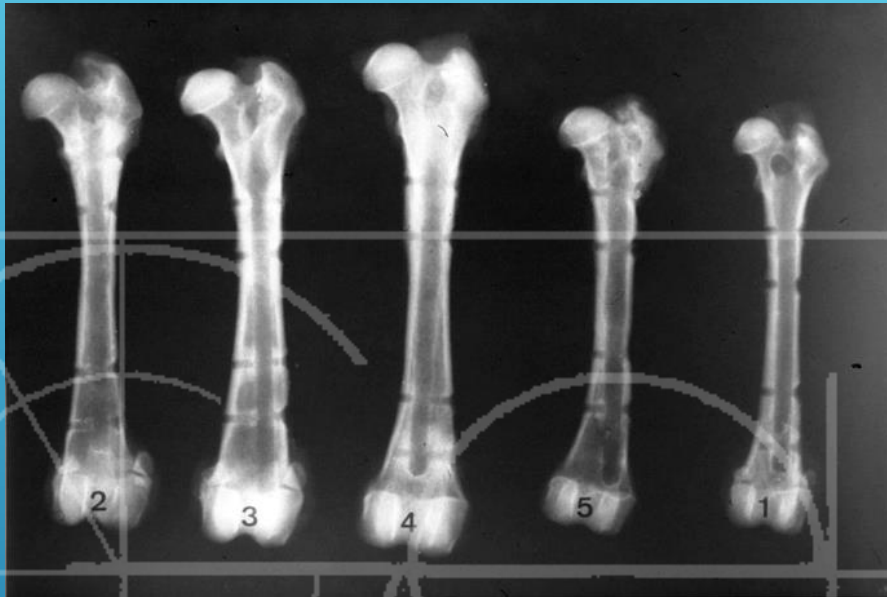
- ▶ Colocación de una placa y un clavo cerrojado sobre un fémur intacto durante 6 meses
- ▶ Medición de la masa ósea antes de la cirugía (dcho- izdo)
- ▶ Medición de 5 zonas
- ▶ Estudio biomecánico
- ▶ Microscopía electrónica



EVOLUCIÓN DE LA MASA ÓSEA EN EL FÉMUR CANINO SOMETIDO A FIJACIÓN INTERNA CON PLACAS DE COMPRESIÓN DINÁMICA Y CLAVOS CERROJADOS



EVOLUCIÓN DE LA MASA ÓSEA EN EL FÉMUR CANINO SOMETIDO A FIJACIÓN INTERNA
CON PLACAS DE COMPRESIÓN DINÁMICA Y CLAVOS CERROJADOS



Clavos cerrojados



Placas DCP

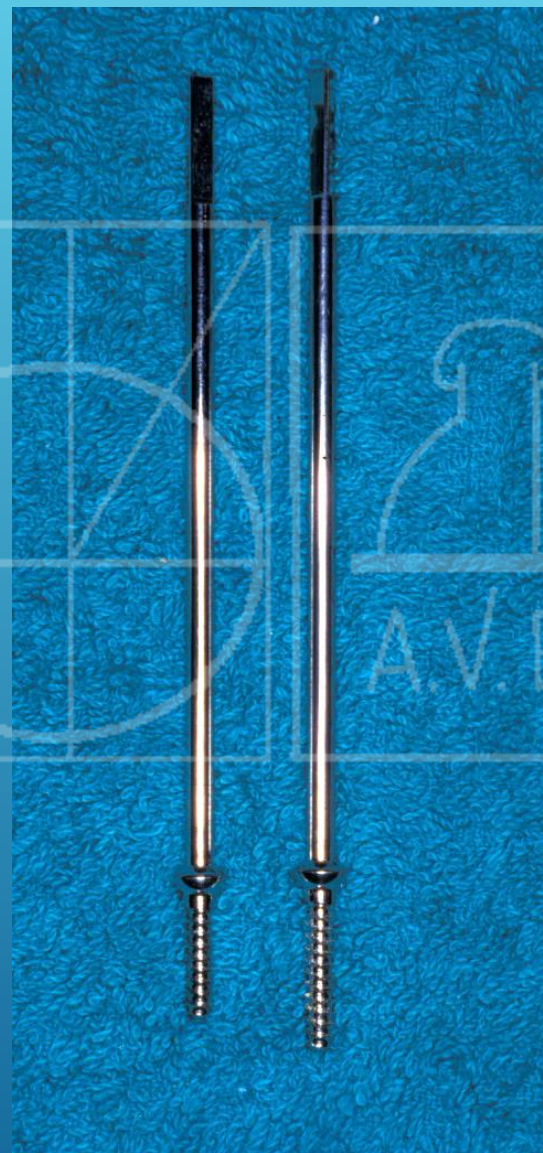
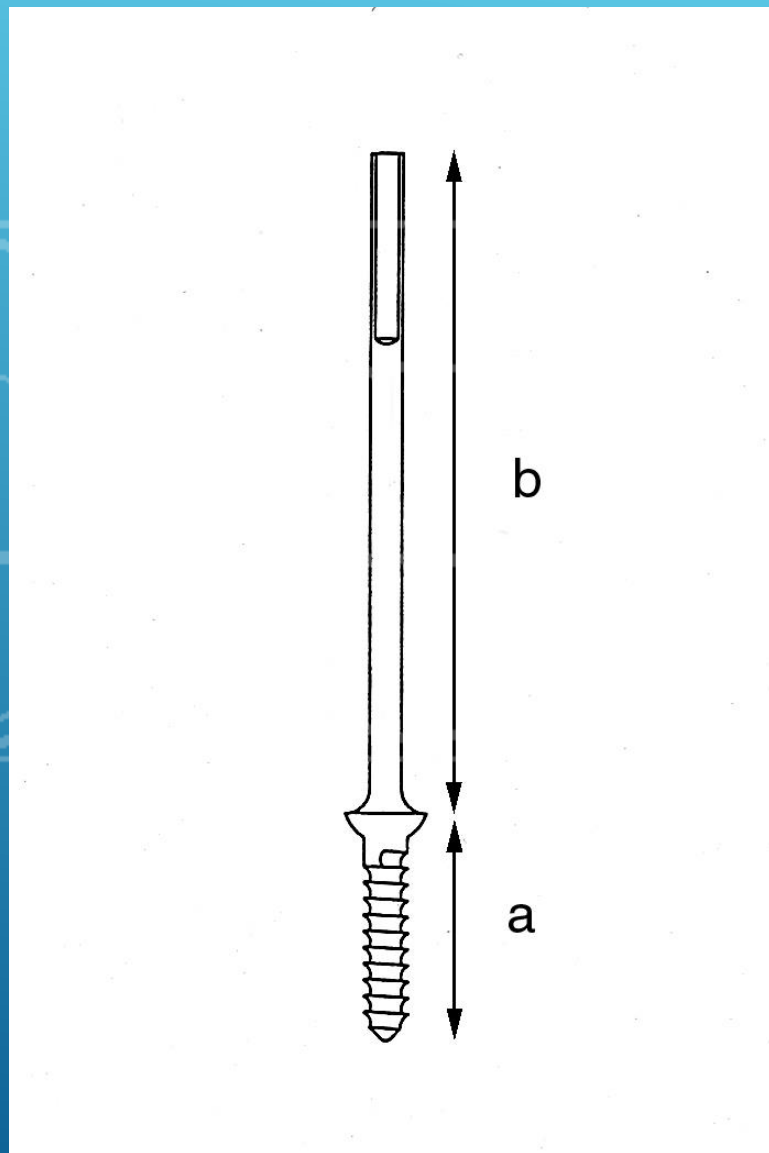
EVOLUCIÓN DE LA MASA ÓSEA EN EL FÉMUR CANINO SOMETIDO A FIJACIÓN INTERNA CON PLACAS DE COMPRESIÓN DINÁMICA Y CLAVOS CERROJADOS

- ▶ 1º. Valores normales masa ósea:
 - ▶ fémur dcho 0.760 ± 0.05
 - ▶ fémur izdo 0.759 ± 0.04
- ▶ 2º. Masa ósea aumentó en todas las regiones (placa). No significativo
Masa ósea disminuyó en todas regiones (CC) siendo significativa en las regiones 1, 2 y 3.
- ▶ Con las placas se produce formación de nuevo hueso a partir del endostio
- ▶ El estudio biomecánico demuestra una mayor debilidad del hueso en los casos tratados con CC y una mayor pérdida de masa ósea

Morales I, Durall I, Díaz-Bertrana MC. BSAVA, Birmingham, 1994: 215-216



Agujas-tornillo

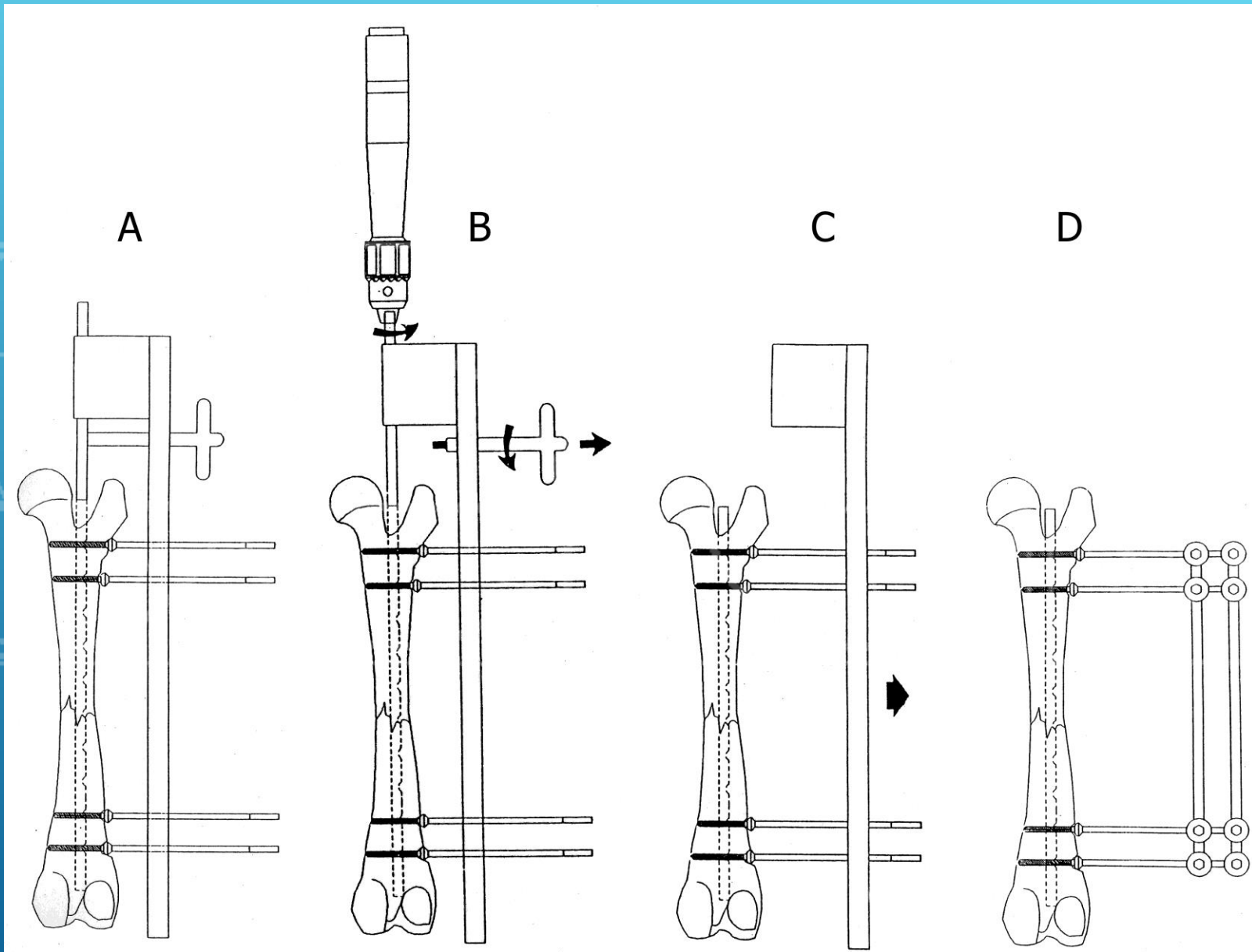


ESTUDIO BIOMECÁNICO

- ▶ Universidad Madison-Wisconsin (1999) Durall I, Lopez M, Dueland T

- ▶ Tubos de plástico de PVC intactos y osteotomizados
- ▶ Objetivo: propiedades estructurales CC-OM
 - ▶ Fijado con tornillos (grupo A)
 - ▶ Fijado con agujas-tornillos y una barra conectora (grupo B)
 - ▶ Fijado con aguja-tornillo y dos barras conectoras (grupo C)
- ▶ Rigidez al doblado craneo-caudal y medio-lateral
- ▶ Rigidez a la torsión



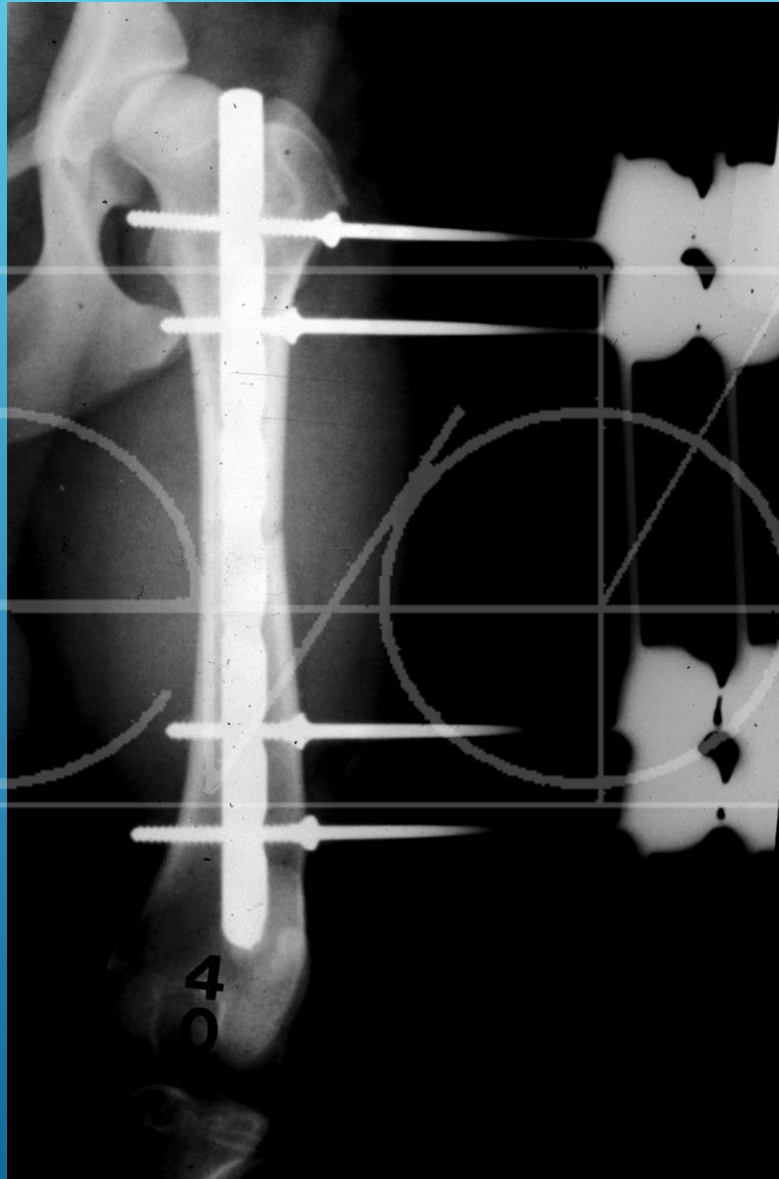
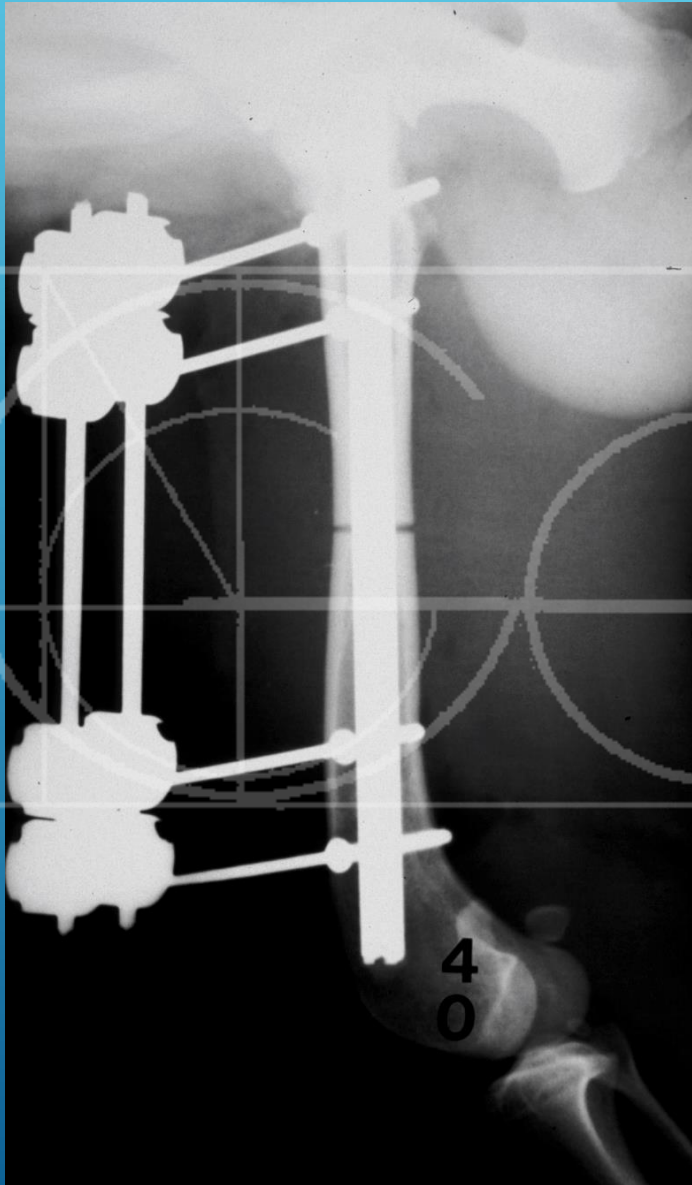


ESTUDIO COMPARATIVO ENTRE LA FIJACIÓN ESTÁTICA Y DINAMIZADA DEL FÉMUR MEDIANTE UN CLAVO CERRROJADO BLOQUEADO CON FIJADORES EXTERNOS

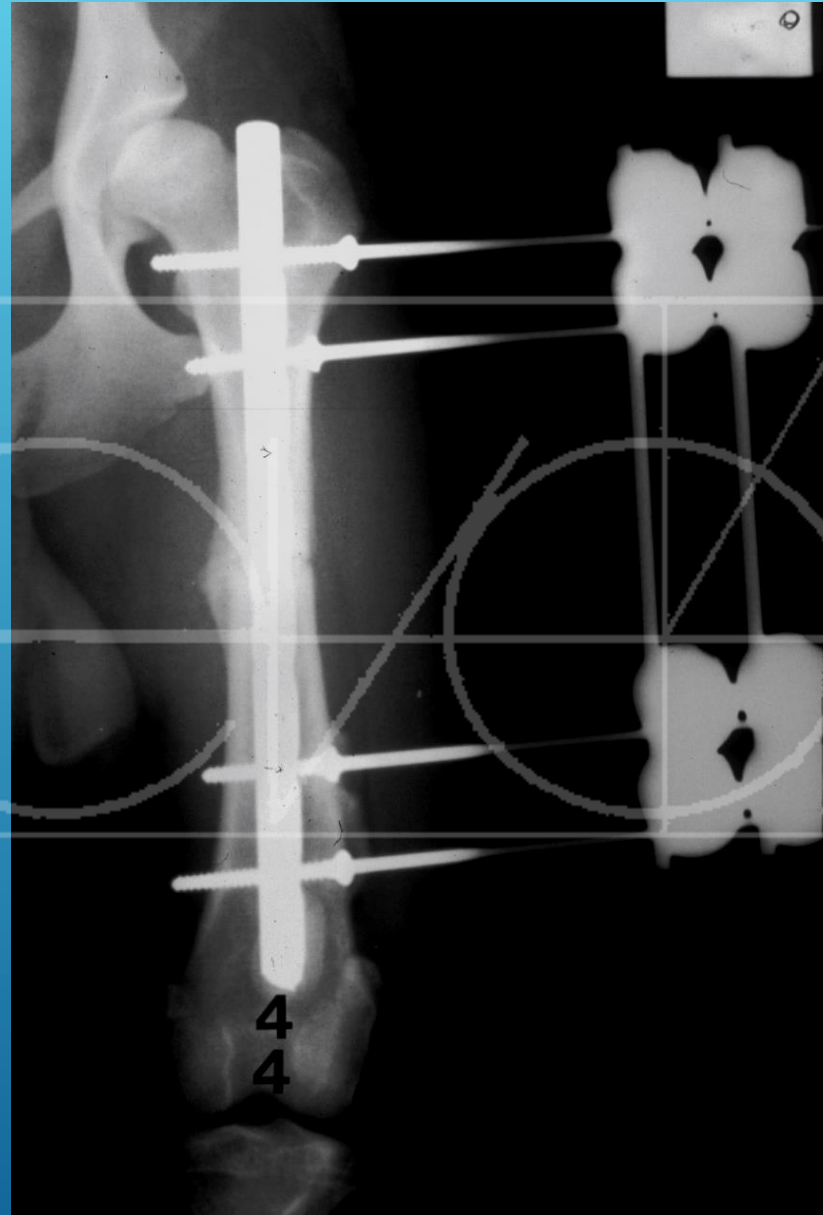
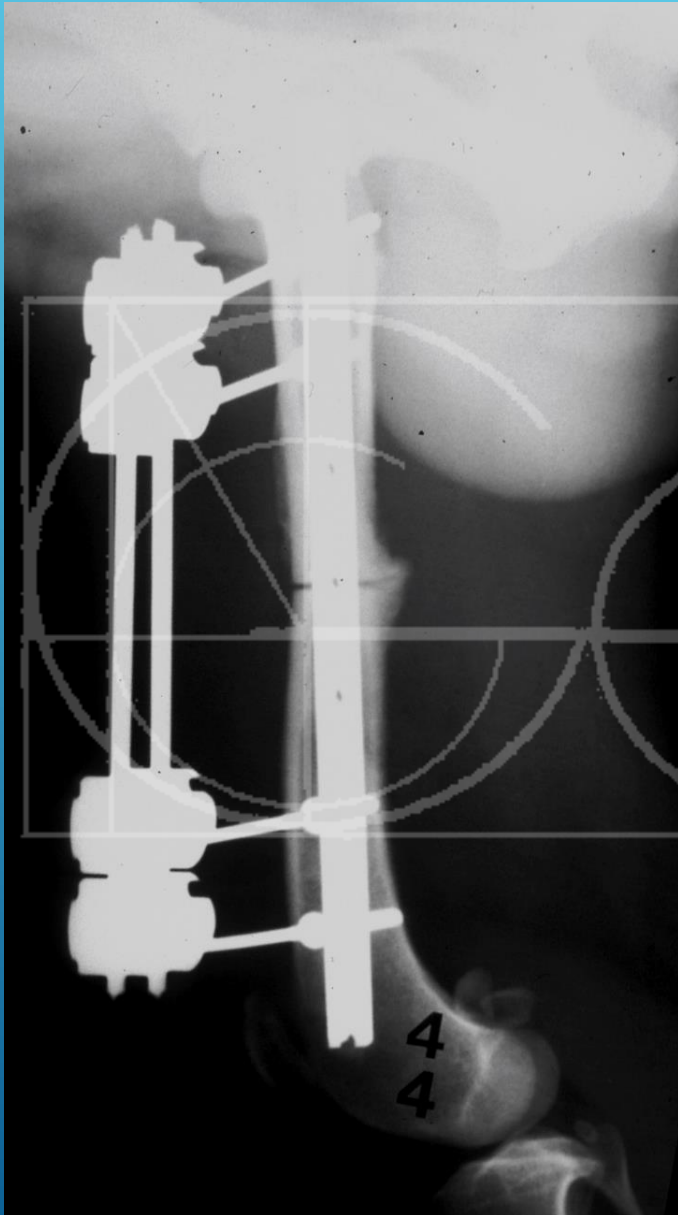
- ▶ Grupo A (estático): 5 animales a los que se aplicó un CC-OC fijado con 4 agujas-tornillo durante 20 semanas
- ▶ Grupo B (dinamizado): 5 animales a los que se aplicó un CC-OC fijado con 4 agujas-tornillo, siendo retiradas las dos más distales a las 4 semanas



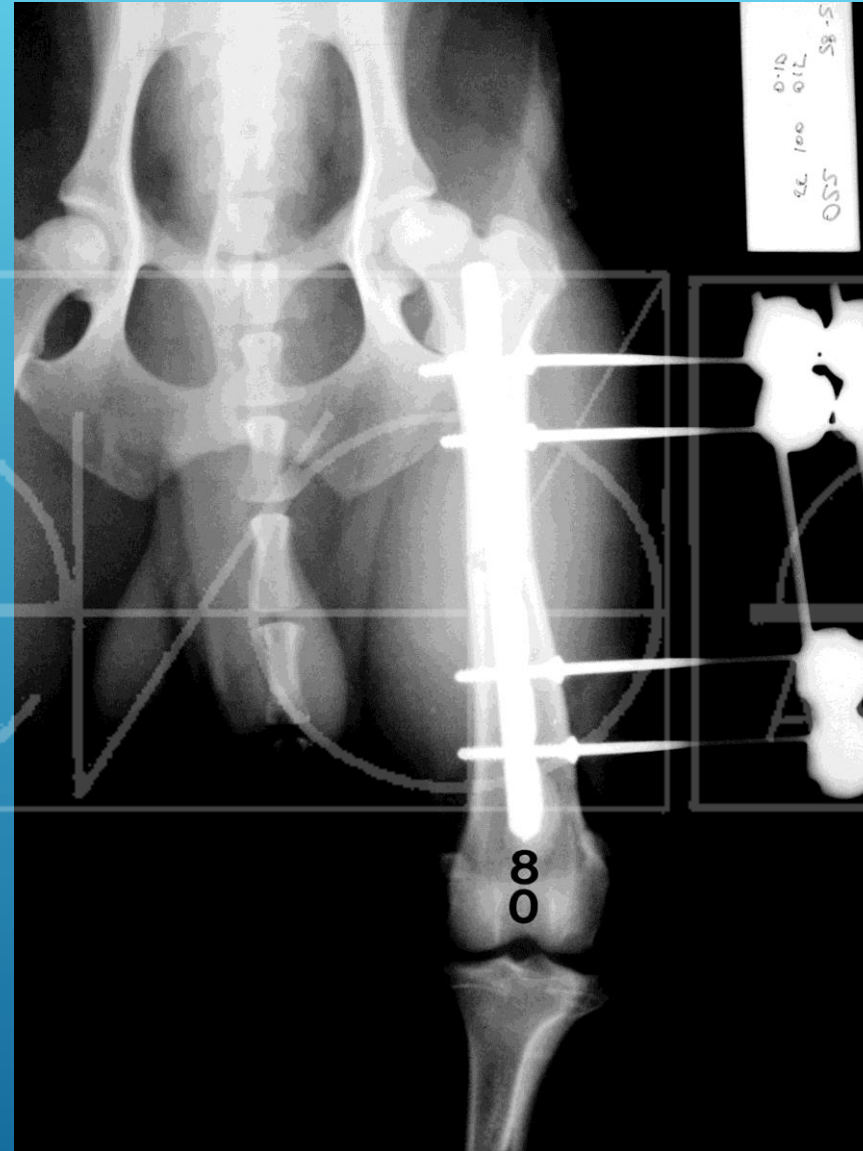
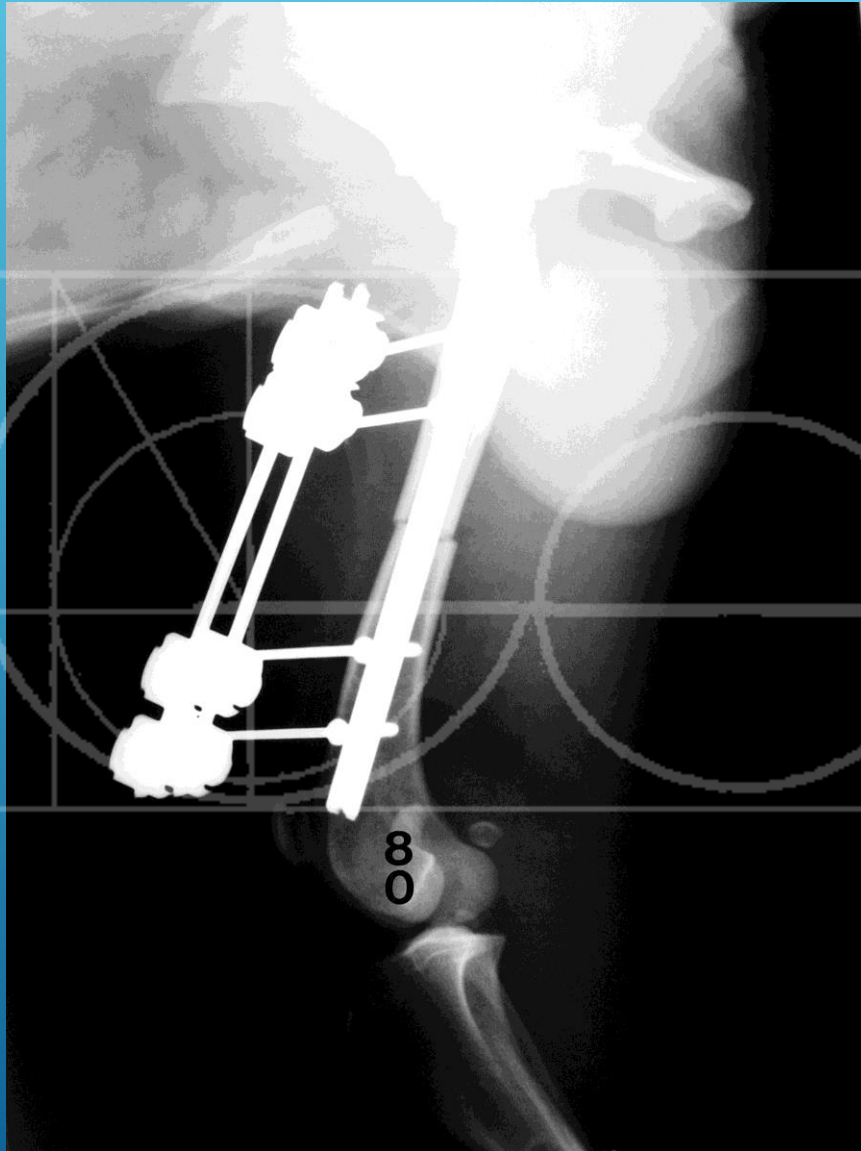
GRUPO ESTÁTICO: CASO 4 A LAS 0 SEMANAS



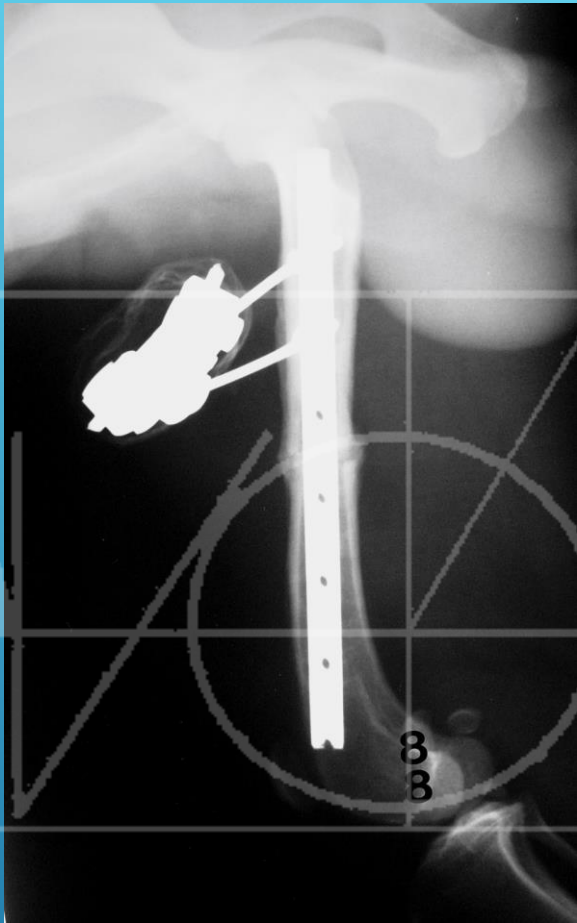
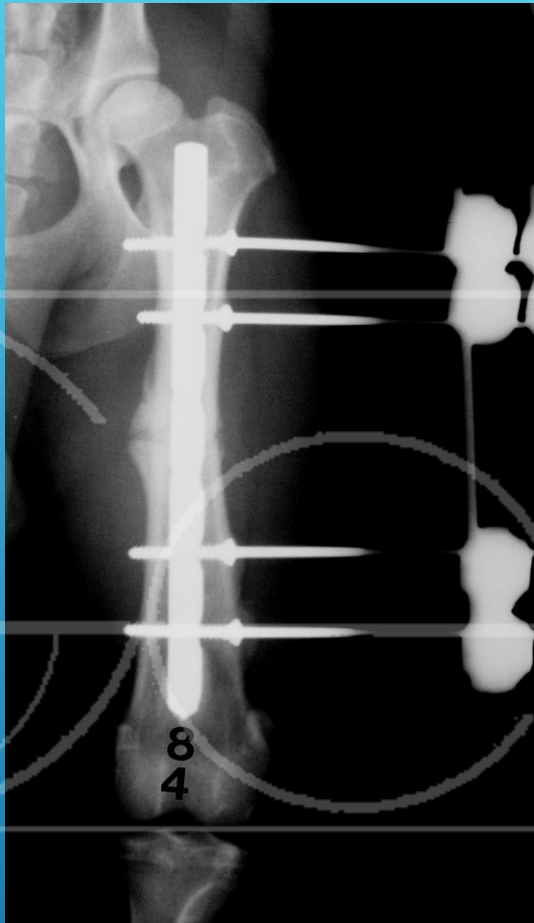
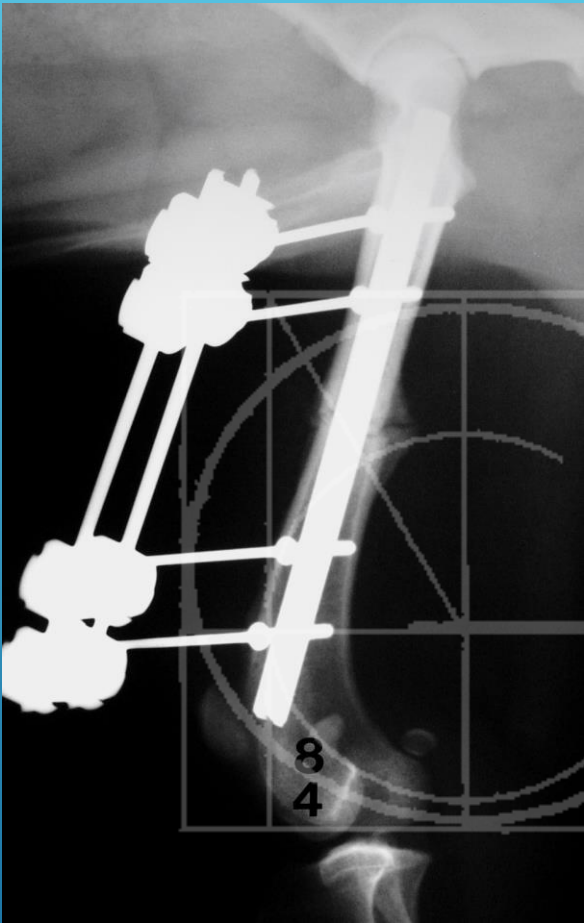
GRUPO ESTÁTICO: CASO 4 A LAS 4 SEMANAS



GRUPO DINAMIZADO: CASO 8 A LAS 0 SEMANAS



GRUPO DINAMIZADO: CASO 8 A LAS 4-8 SEMANAS



ESTUDIO COMPARATIVO ENTRE LA FIJACIÓN ESTÁTICA Y DINAMIZADA DEL FÉMUR MEDIANTE UN CLAVO CERRROJADO BLOQUEADO CON FIJADORES EXTERNOS

- ▶ 1°. La recuperación funcional es mas prolongada que cuando utilizamos tornillos. La dinamización mejora la funcionalidad
- ▶ 2°. La dinamización a las 4 semanas, evita la anquilosis de la rodilla pero no acelera la consolidación de las fractures
- ▶ 3°. La consolidación se produce entre las 8-20 semanas. La fijación con agujas-tornillo produce reacciones periostales, resorción ósea y a veces esclerosis

Durall I, Falcón C, Díaz-Bertrana MC. Effects of Static Fixation and Dynamization after Interlocking Femoral Nailing Locked with an External Fixator: An Experimental Study in Dogs. Vet Surg 33:323-332, 2004



IMAGEN LIMPIAPARABRISAS

Ebraheim NA, Sabry FF, Elgafy H. Intramedullary fibular allograft and nail for treatment of femoral shaft nonunion
Am J Orthop 31:270-272, 2002

Larin et al: Repair of diaphyseal femoral fractures in cats using interlocking intramedullary nails: 12 cases (1996-2000)
JAVMA 219:1098-1104, 2001



IMAGEN LIMPIA PARABRISAS

Maletis GB, Basset GS. J. Windshield-Wiper Loosening: A Complication of In Situ Screw Fixation of Slipped Capital Femoral Epiphysis Ped Orthop 13: 607-609, 1993.

Imagen radiolúcida hueca que aparece en la punta de los tornillos canulados titanio utilizados en el deslizamiento de la epífisis proximal de la cabeza del fémur

Morrissy RT, Busch MT. Letter to editor. J Ped Ortho 14:549-550, 1994.

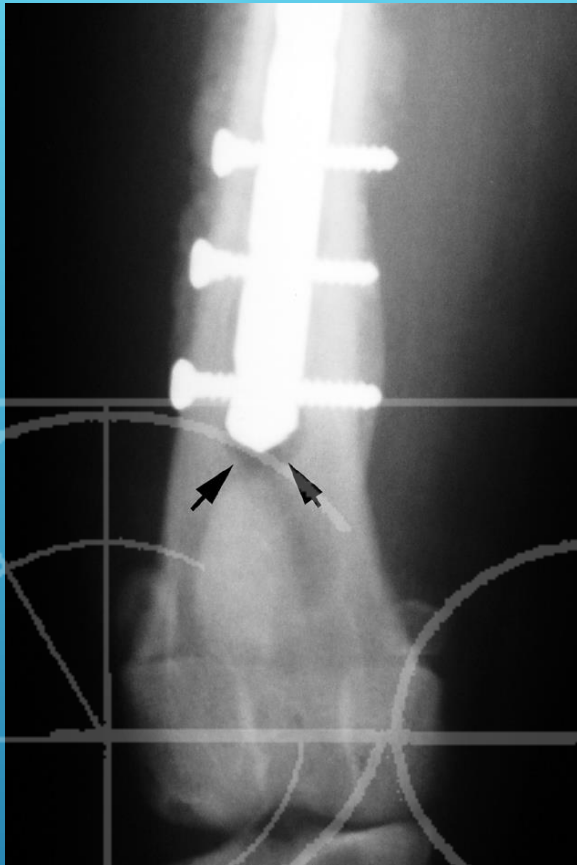
Aparecen a los 6-7 meses y se resuelve a veces a los 15-16 meses. Si fuera movimiento debería aparecer también en el otro extremo del implante.

Calentamiento del hueso y esquirlas hacen una necrosis térmica.

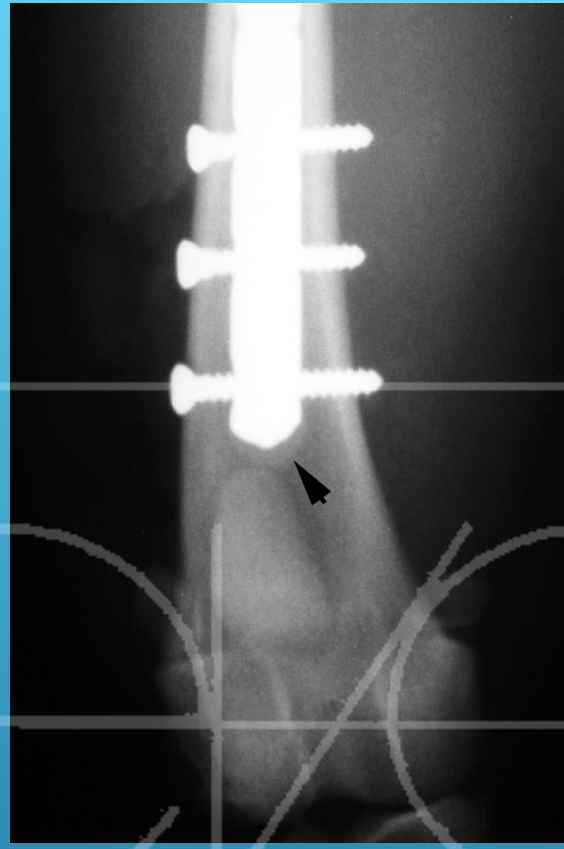


FRACTURAS DIAFISARIAS

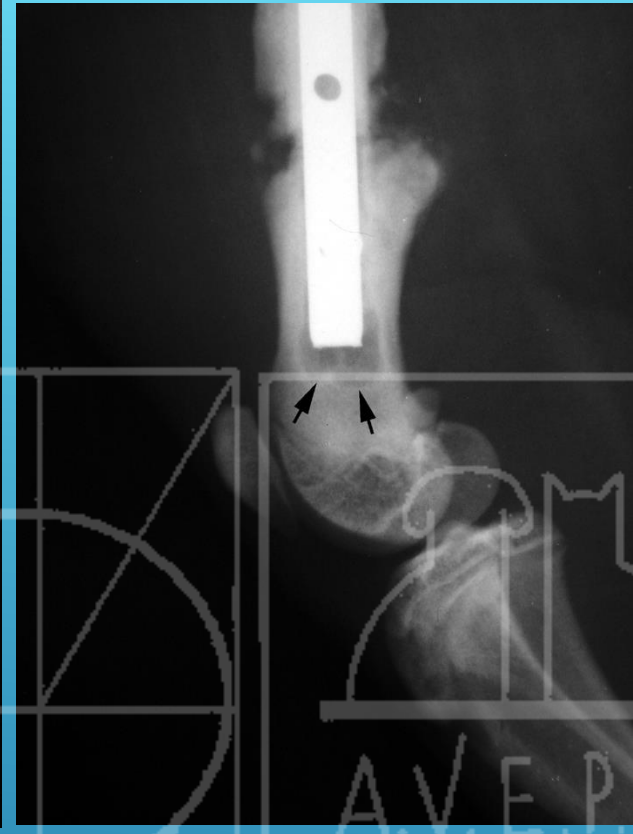




Caso 2. Boxer 35 kg.



Caso 2 a las 8 semanas



Gato 4 semanas

A.V.E.P.A.

Durall I, Díaz-Bertrana MC, Puchol JL, Franch J: Radiographic findings related to interlocking nailing: windshield-wiper effect, and locking screw failure Vet Comp Orth Traum 4:1-6, 2003.

- * No está producida ni por causas biomecánicas ni biomateriales ni por calentamiento.
- * Respuesta inflamatoria localizada:
 - Bajo grado de contaminación bacteriana
 - Pérdida de la superficie pasivada con liberación de iones.
 - El pasivado se recupera in vivo con el tiempo resolviéndose la reacción local.



Efecto limpiaparabrisas / Windshield-wiper effect



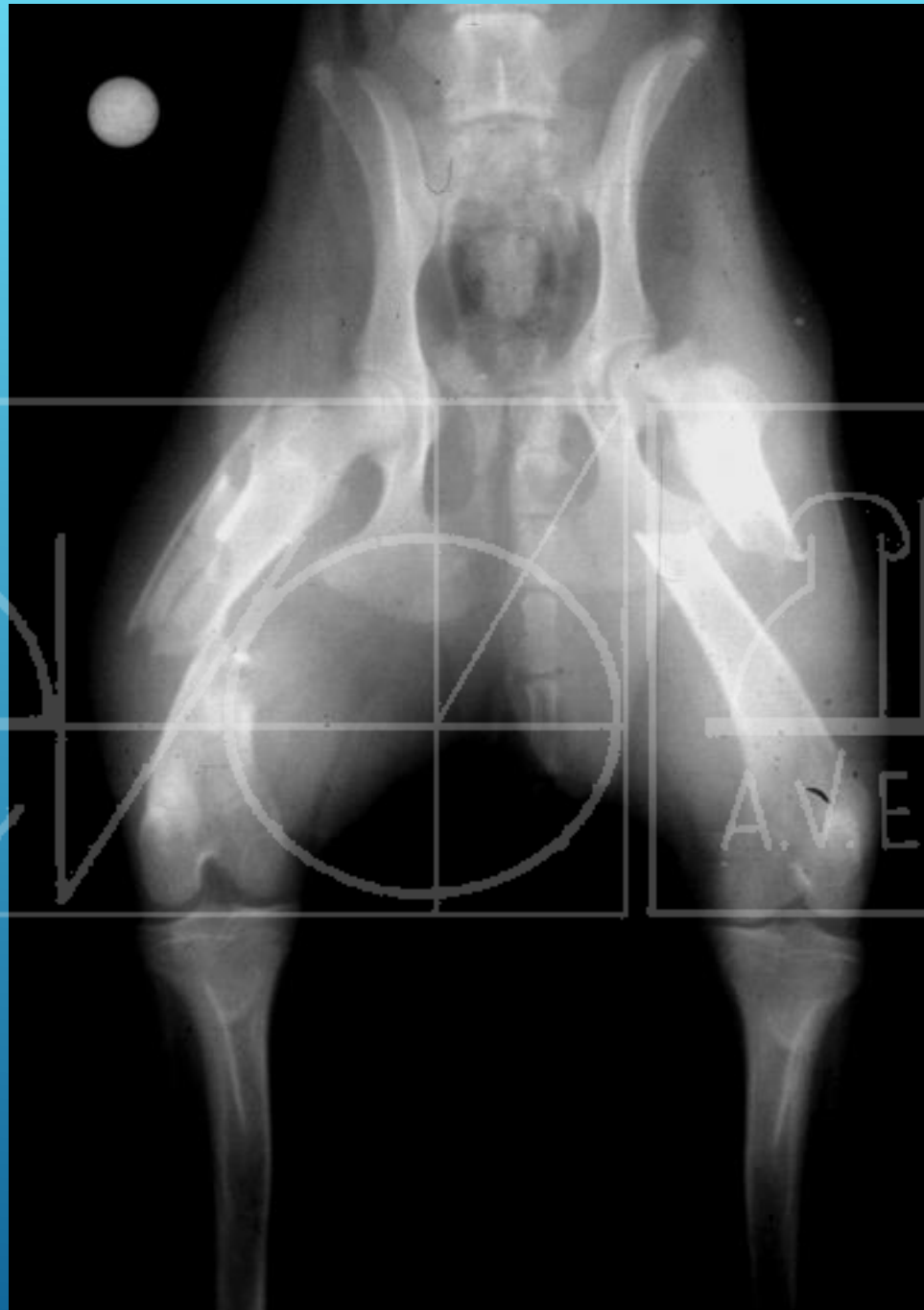
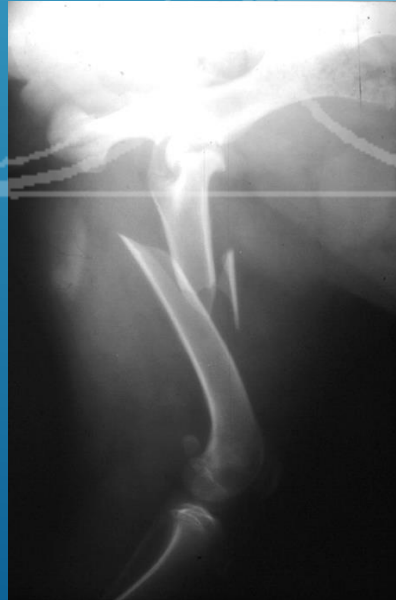
ESTUDIOS CLÍNICOS

Durall I, Díaz MC, Morales I. Interlocking Nail Stabilization of Humeral fractures. Initial Experience in Seven Clinical Cases. *Veterinary and Comparative Orthopedic & Traum*, 7:3-8, 1994

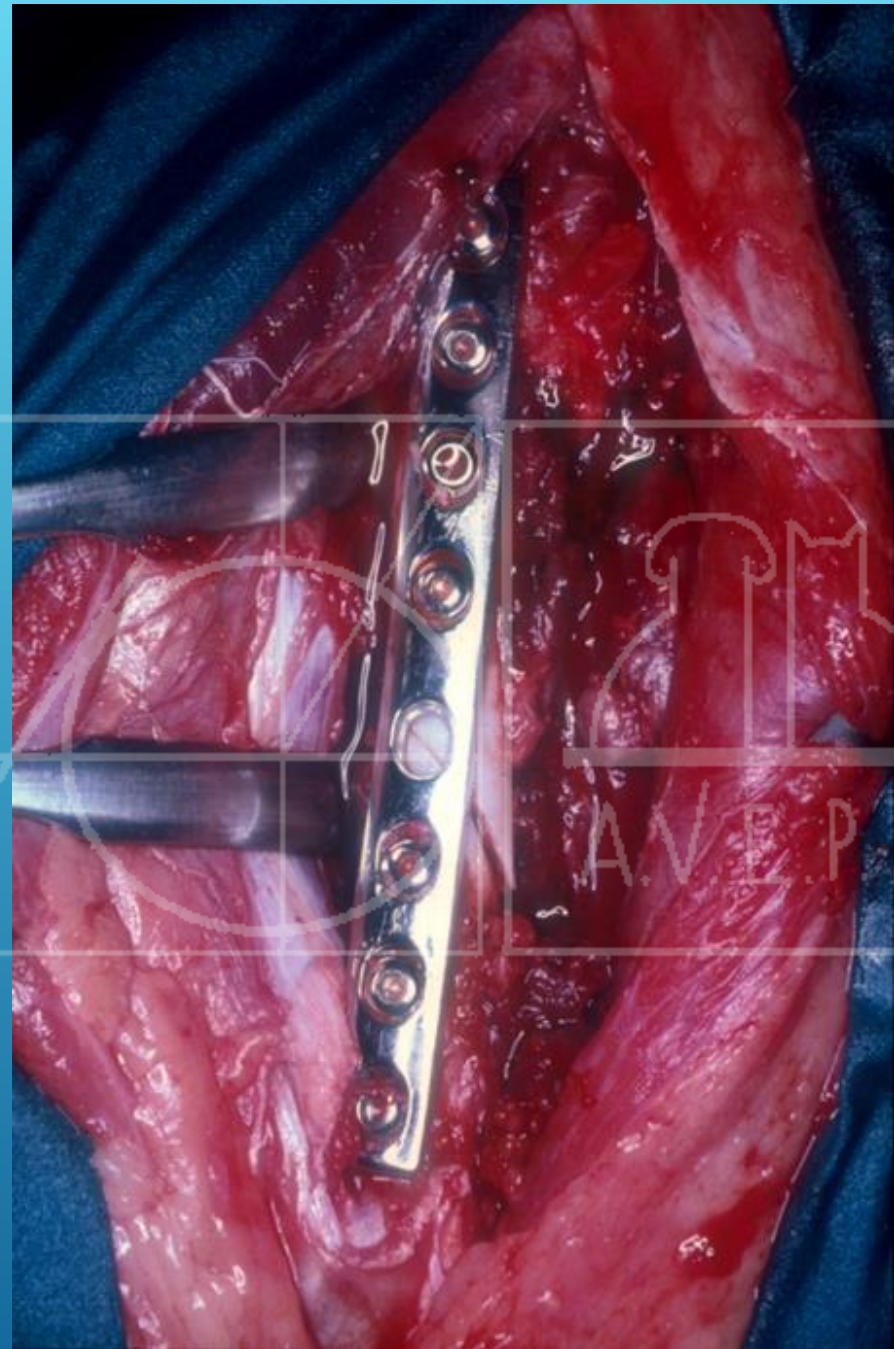
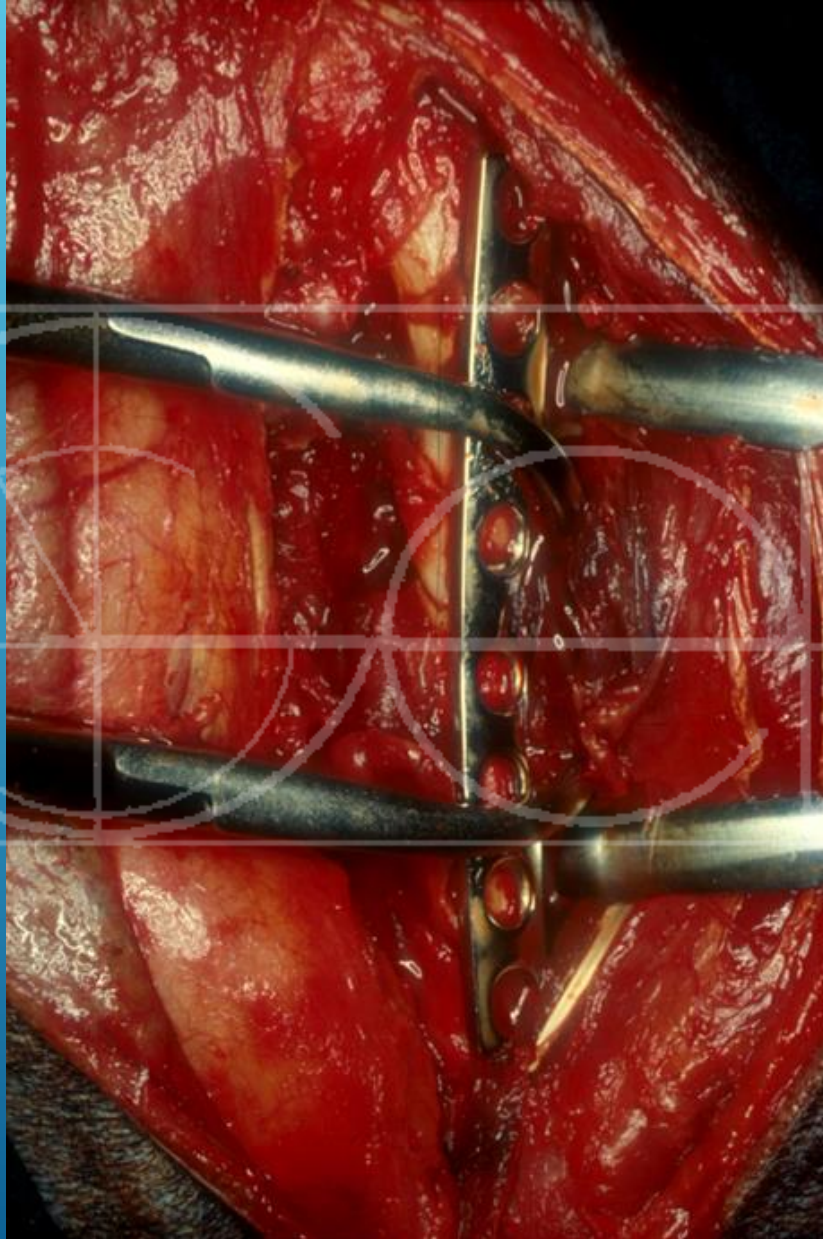
Durall I, Díaz MC. Early Experience With the Use of an Interlocking Nail for the Repair of Canine Femoral Shaft Fractures. *Vet Surg* 25:397-406, 1996

Díaz-Bertrana MC, Durall I, Puchol JL, Sanchez A. Interlocking nail treatment of long bone fractures in cats: 33 cases (1995-2004). *Veterinary and Comparative Orthopedic & Traum* 18:119-26, 2005

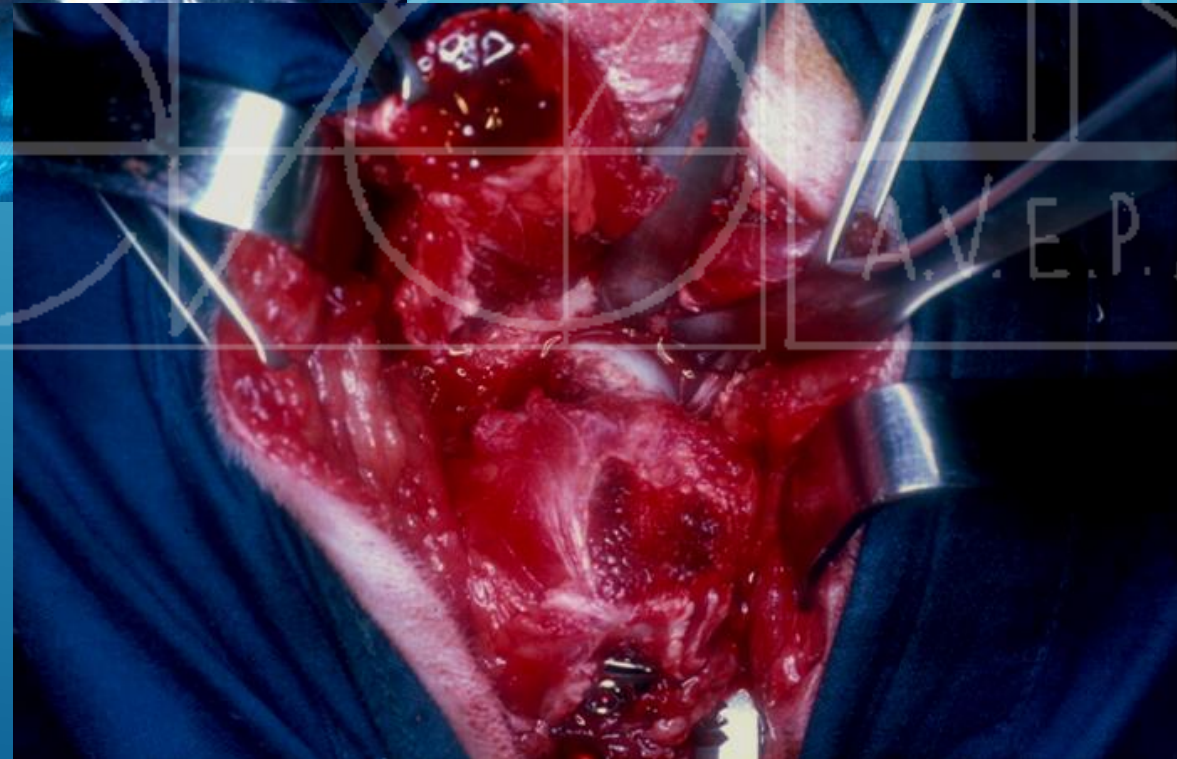
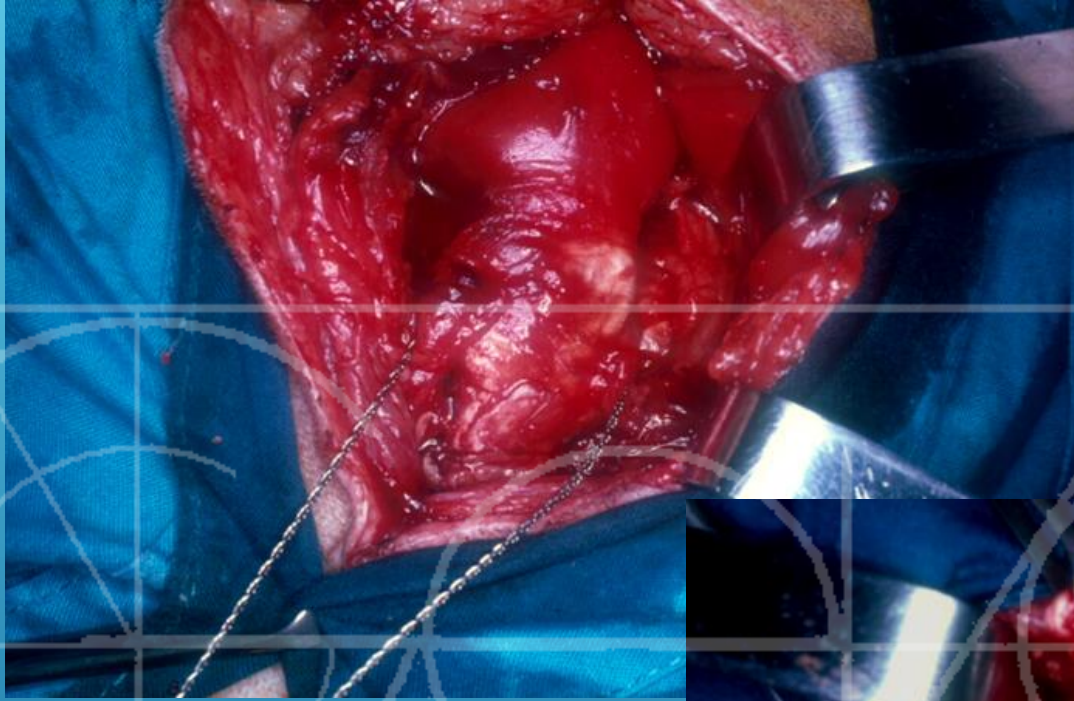
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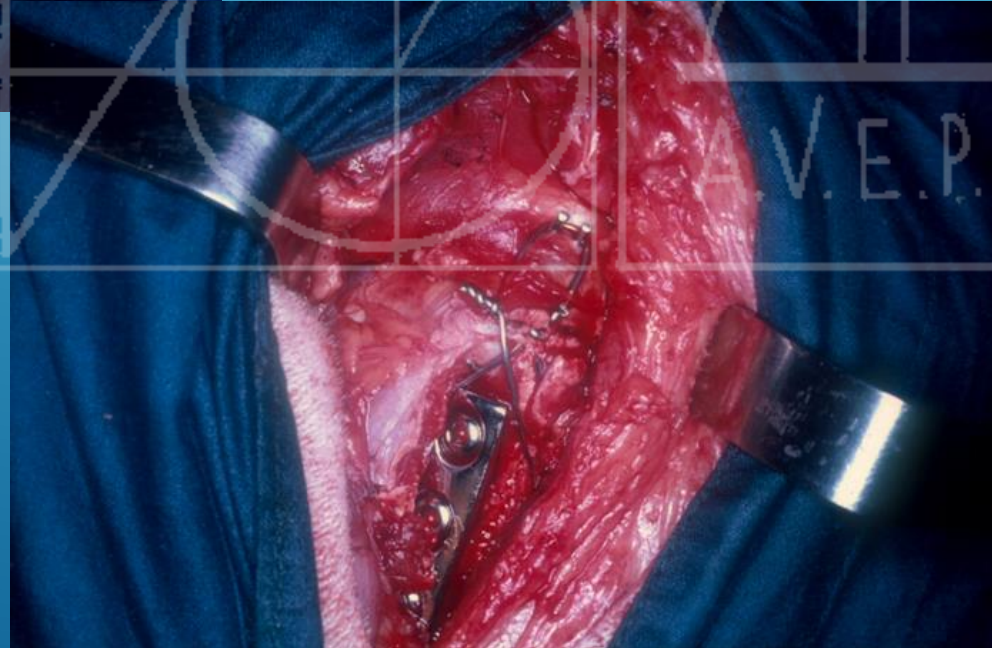
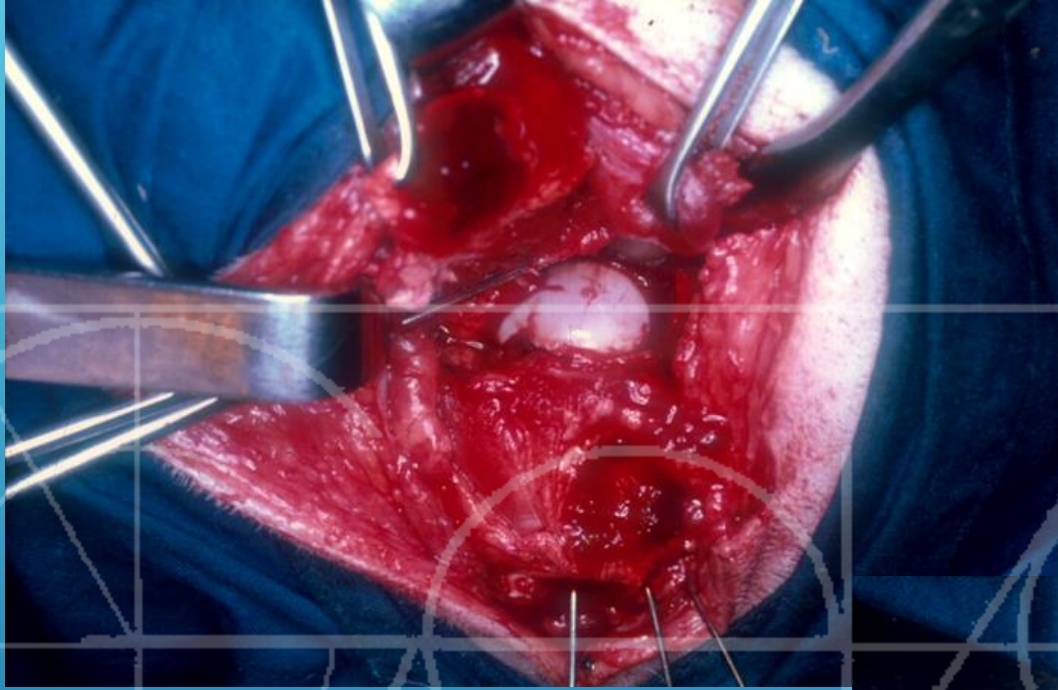
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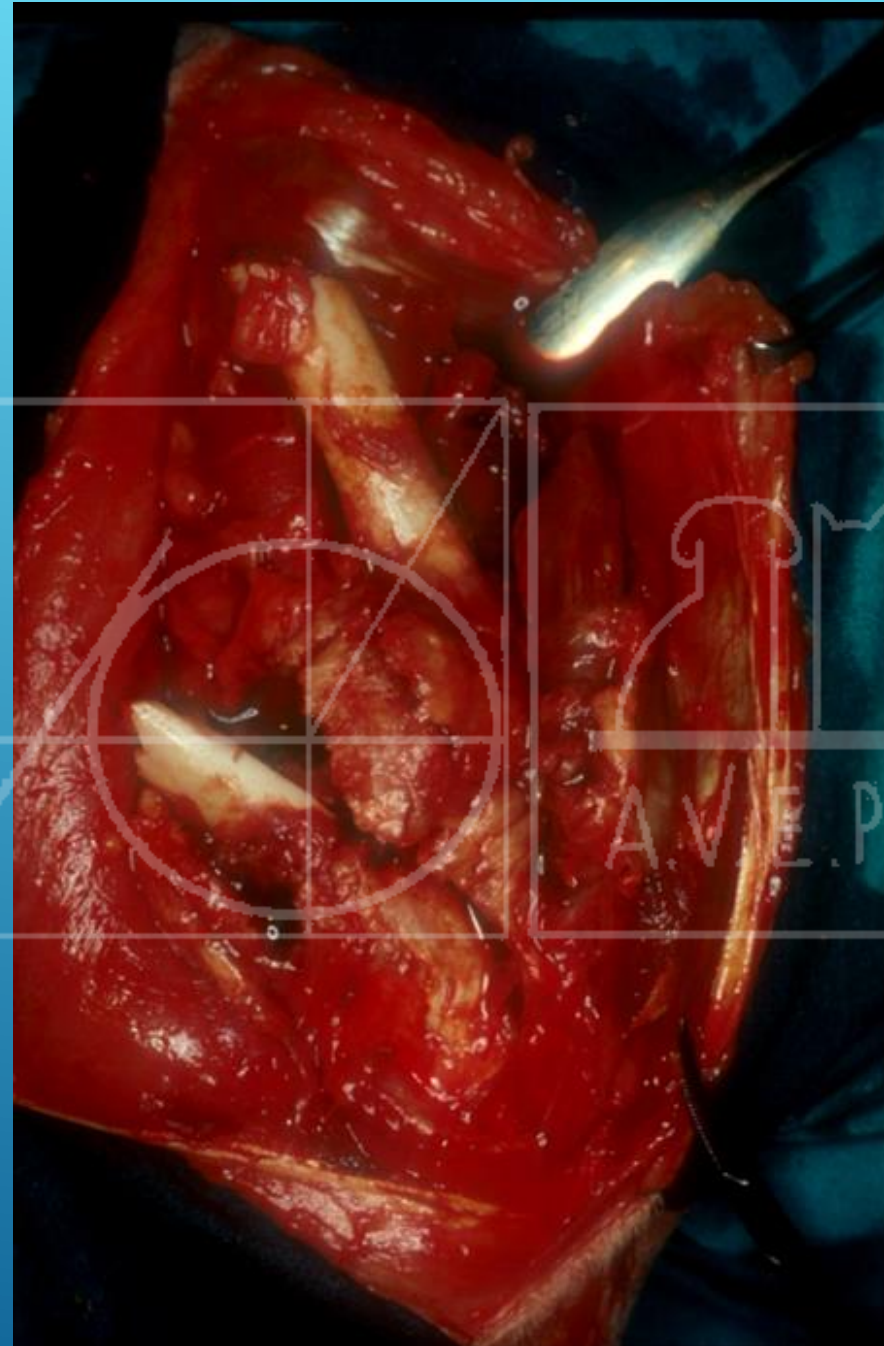
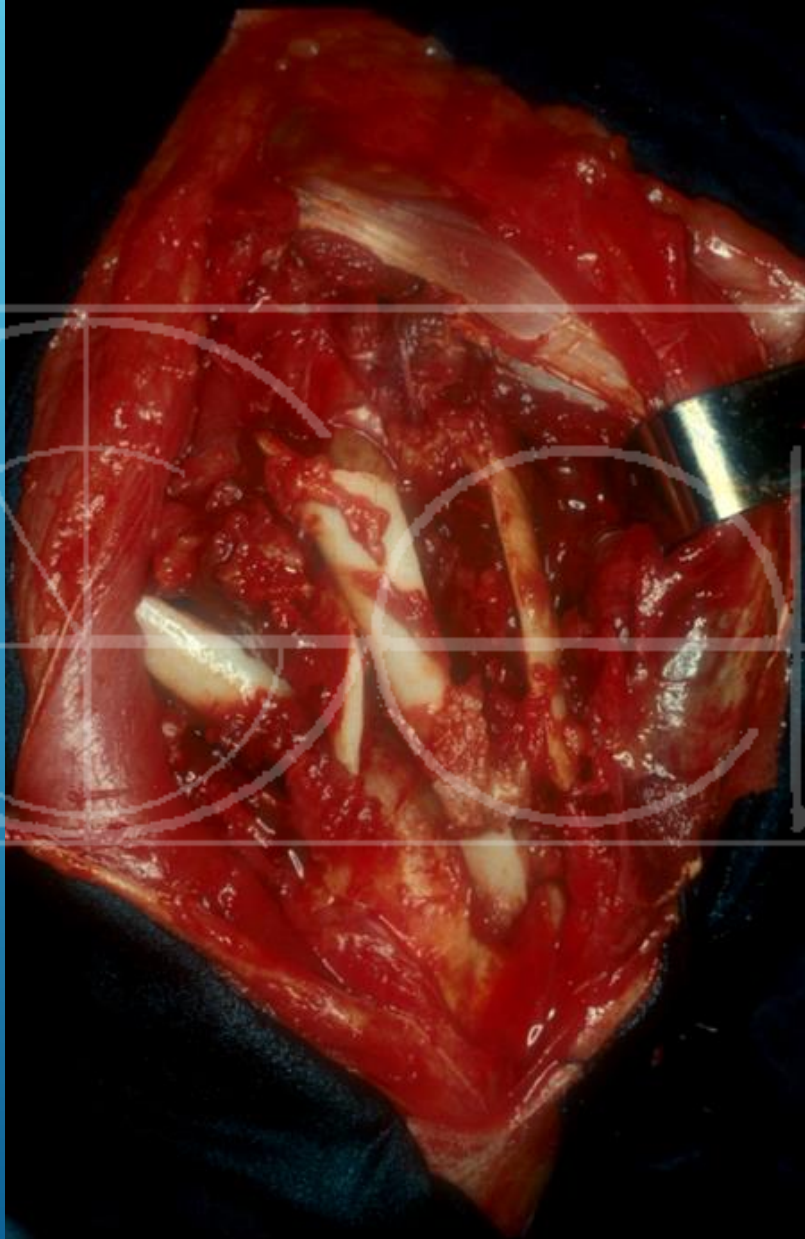


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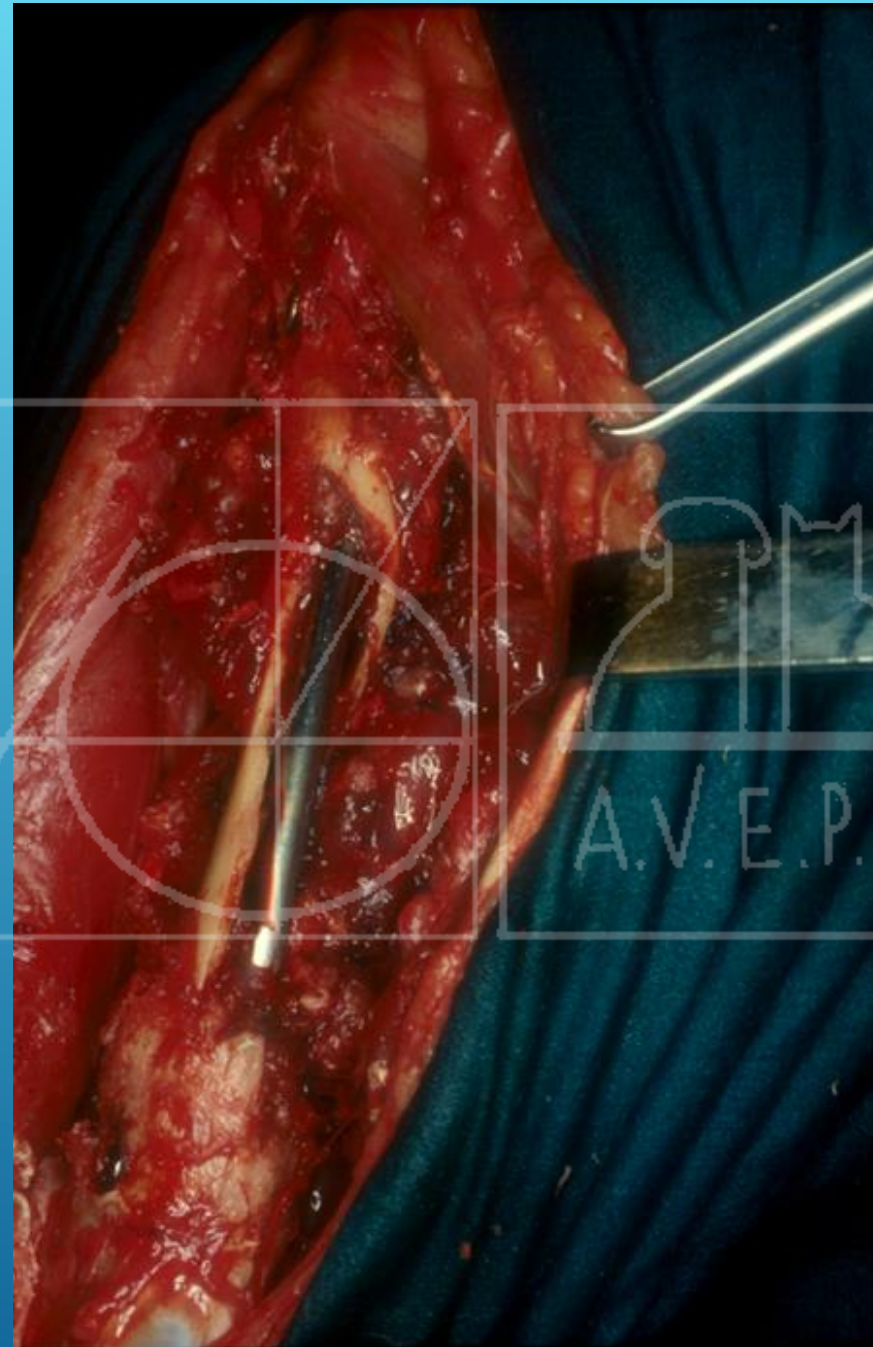
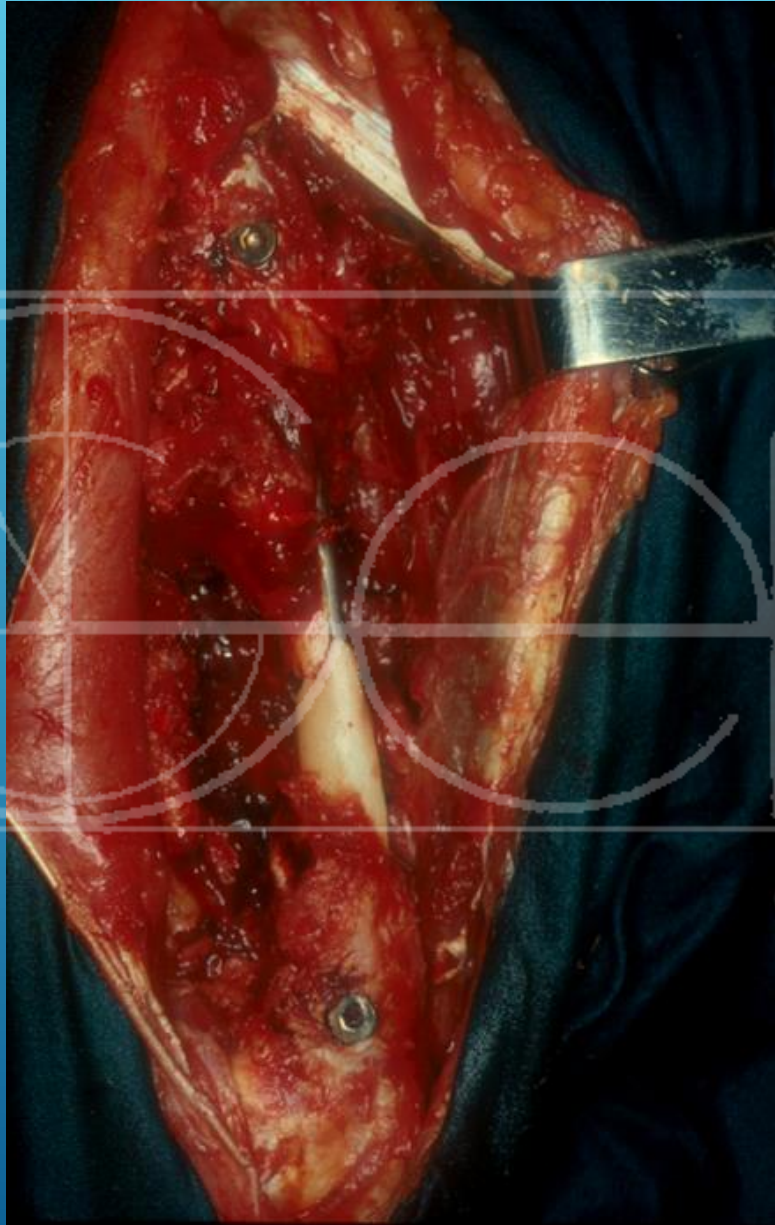
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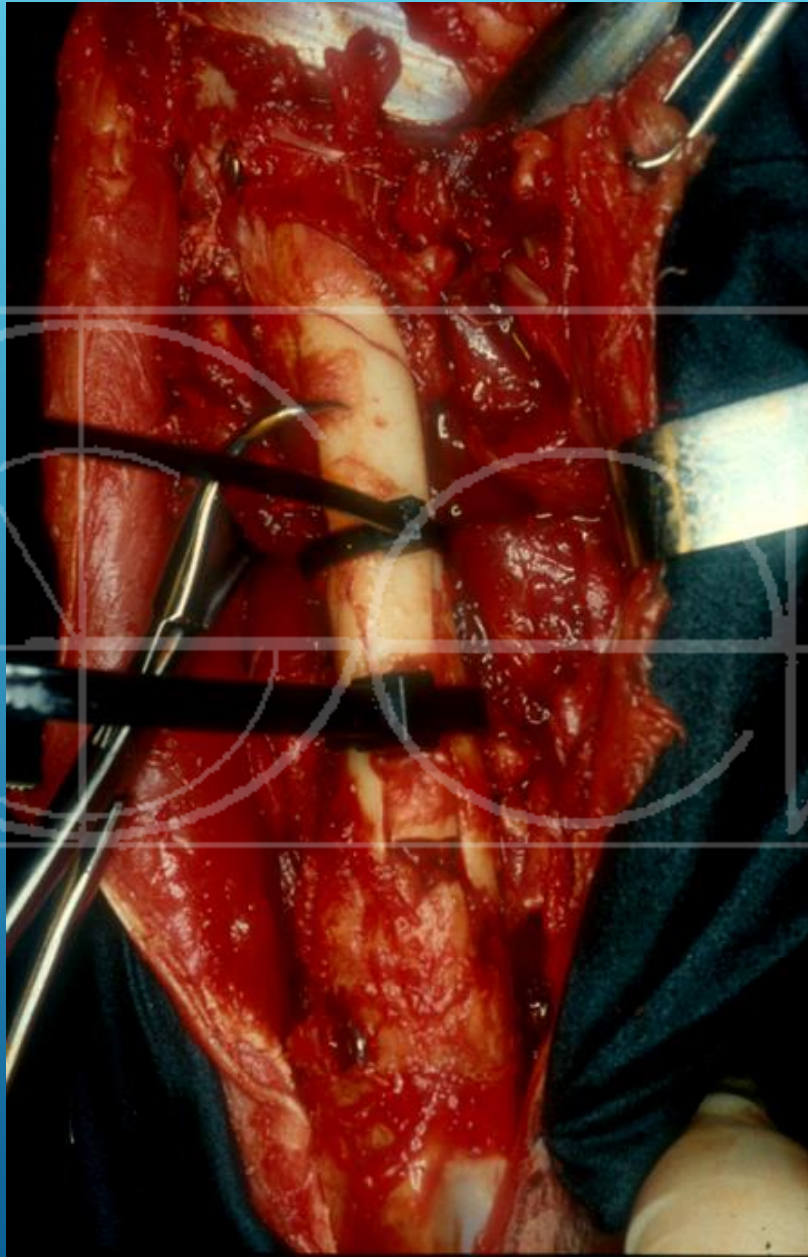
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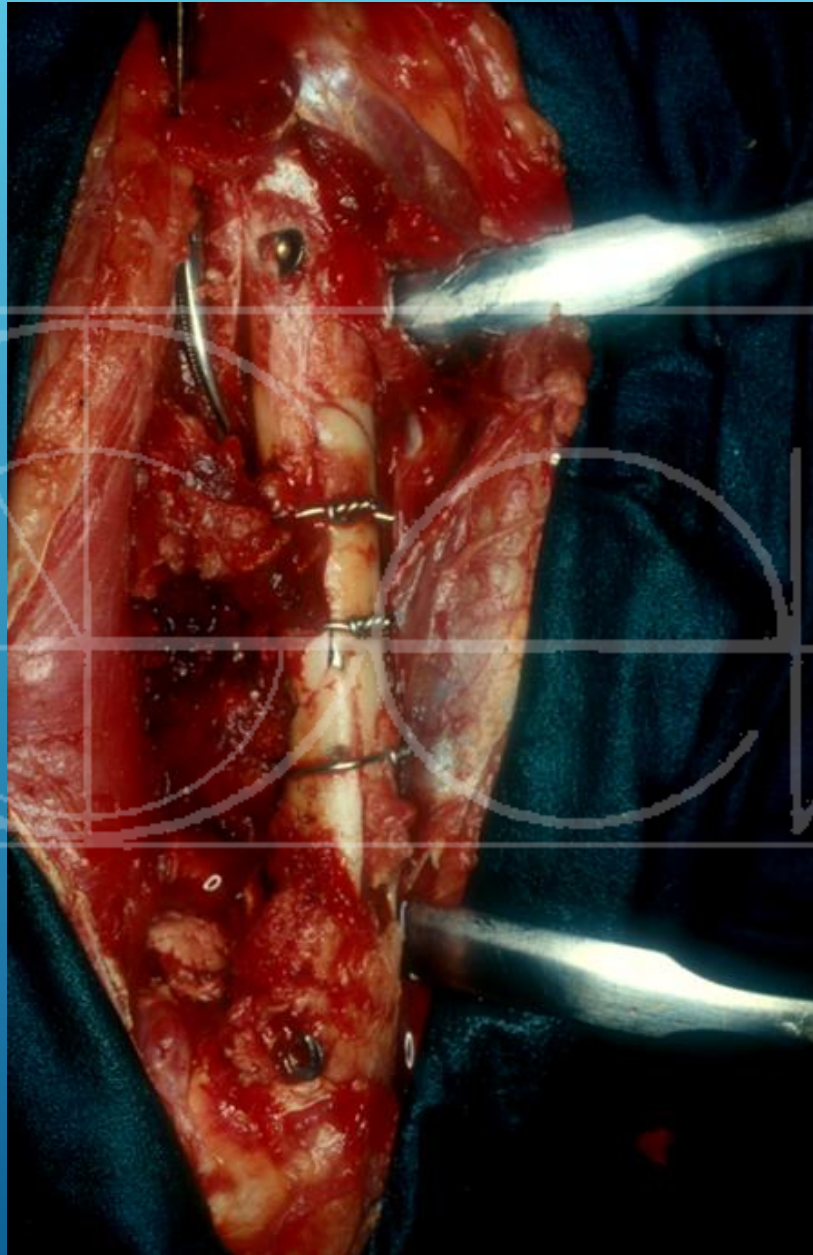


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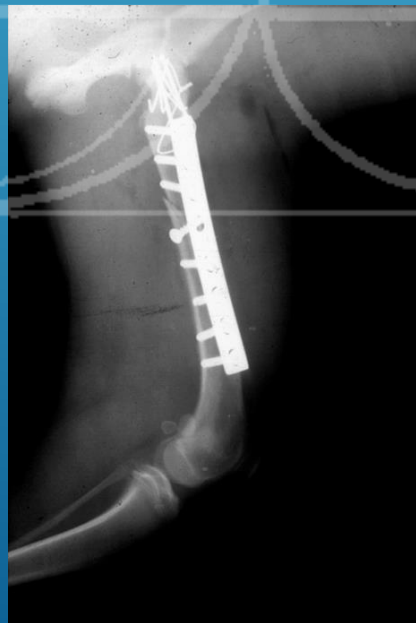
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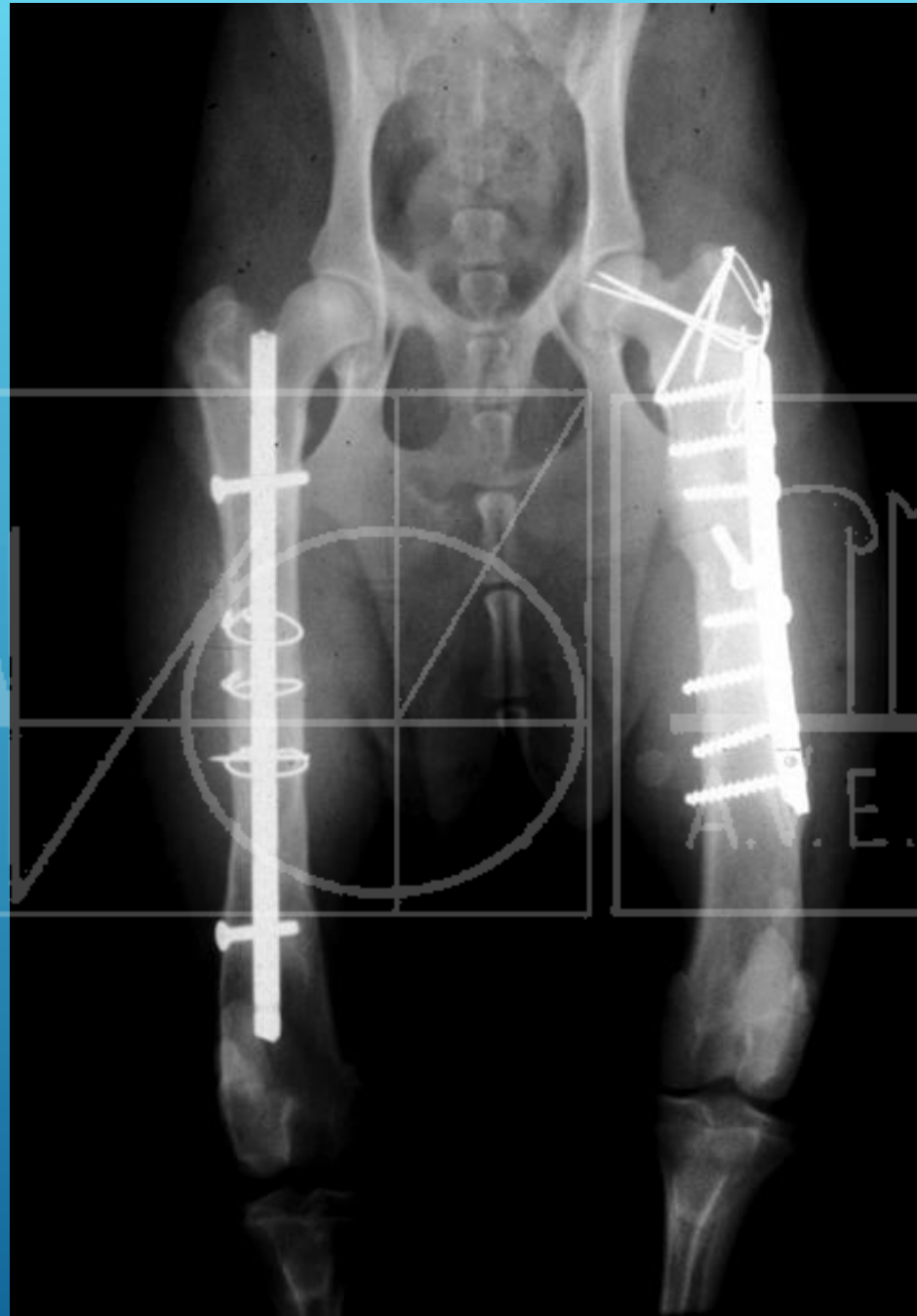
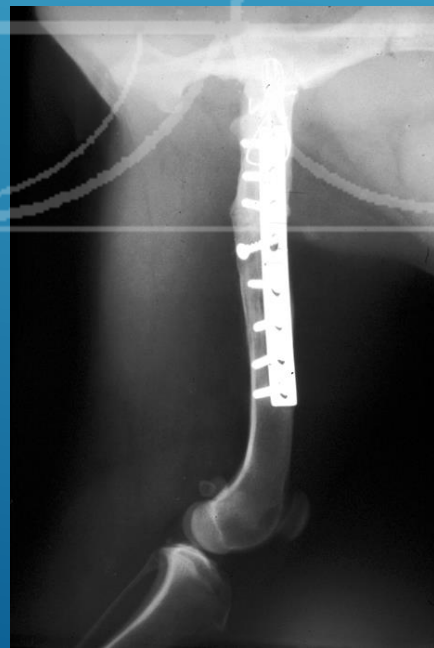
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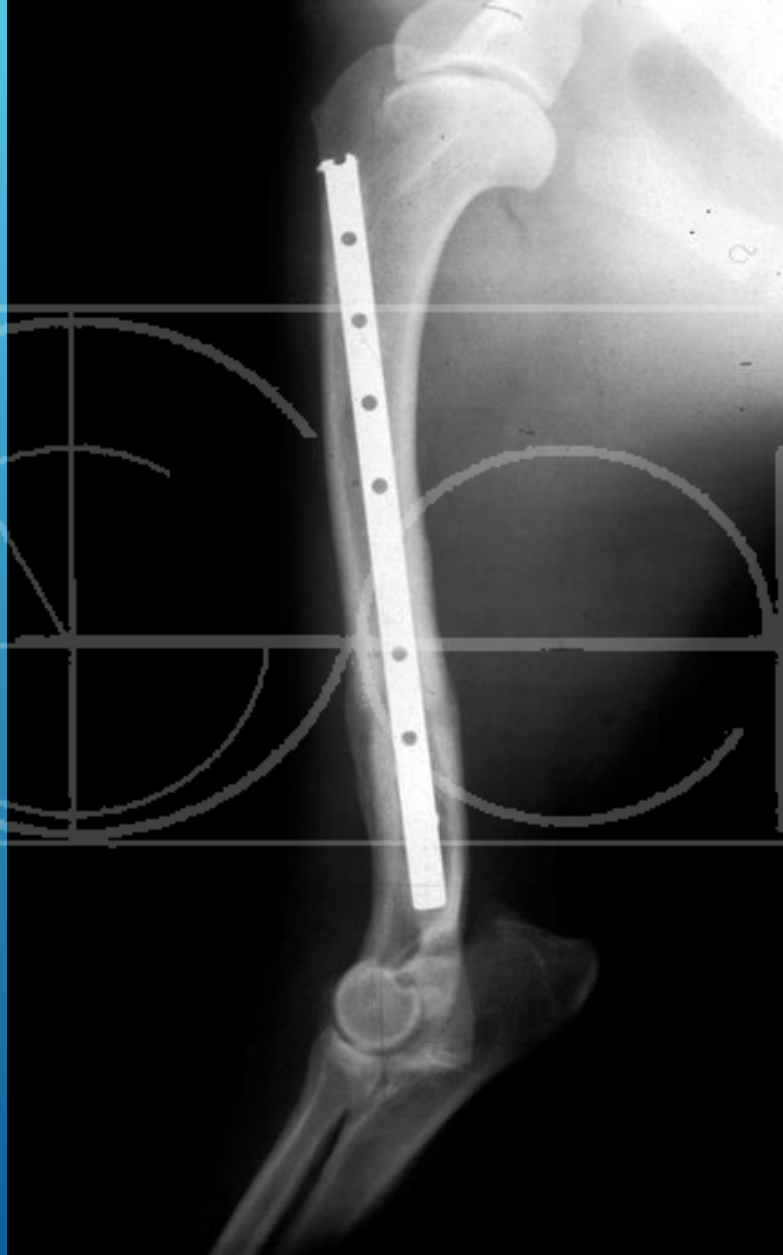
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FRACTURAS
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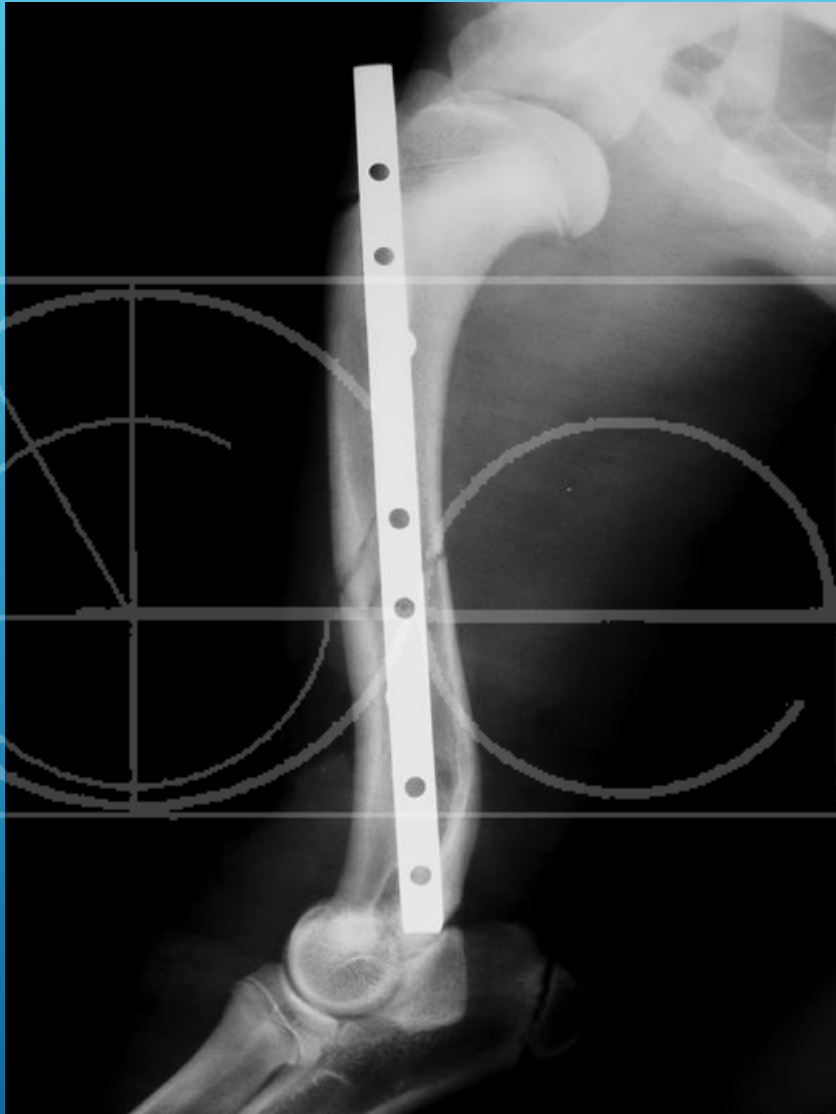
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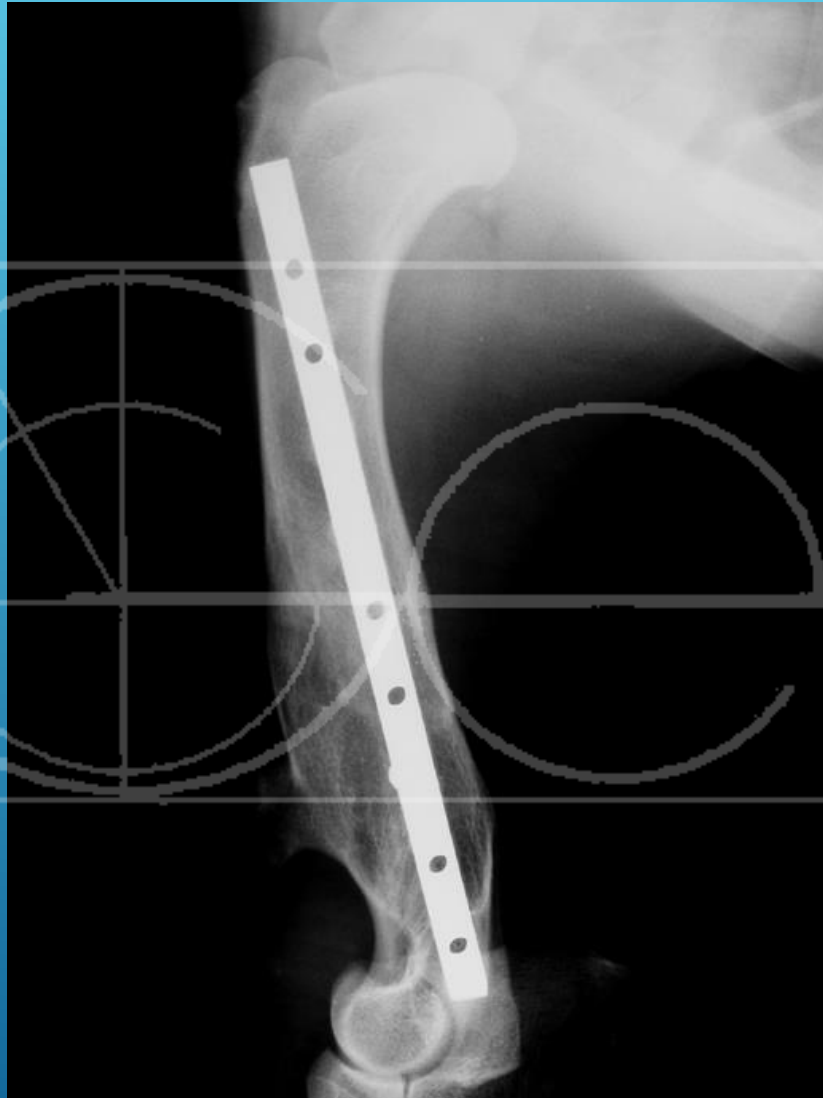
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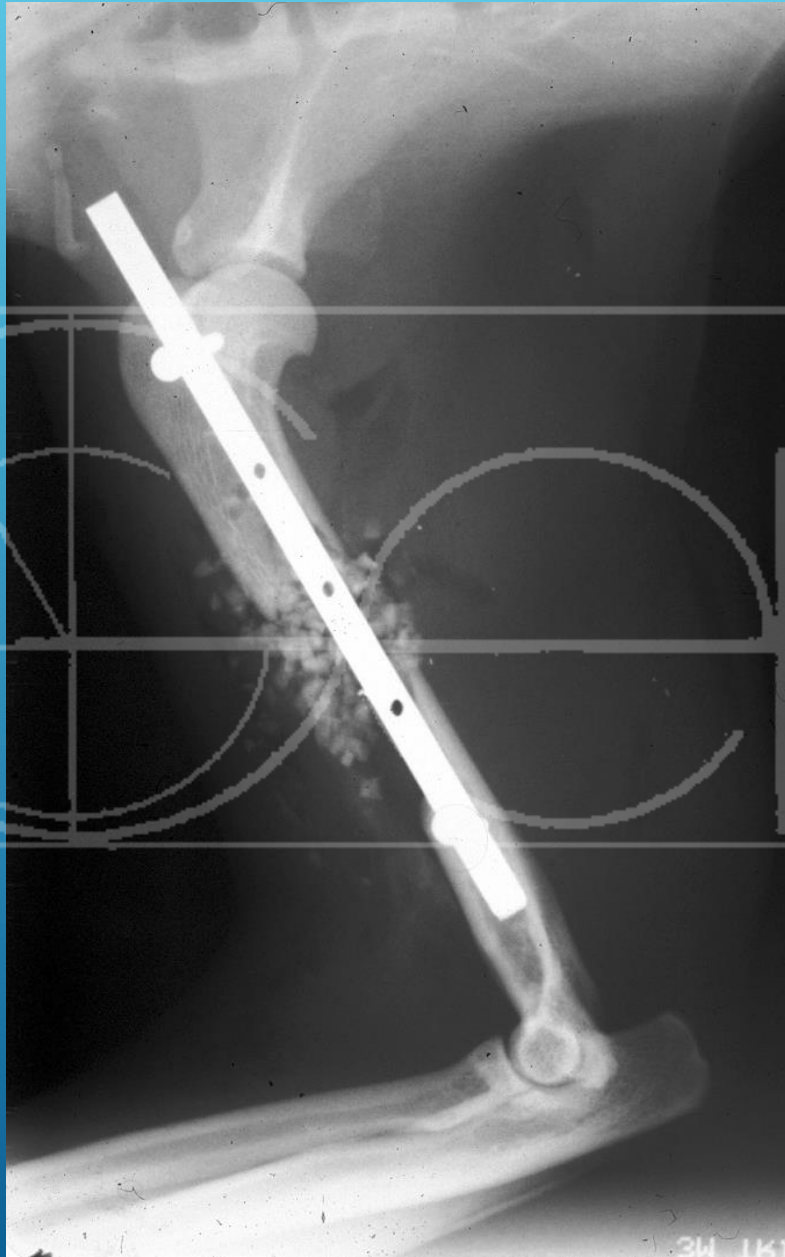
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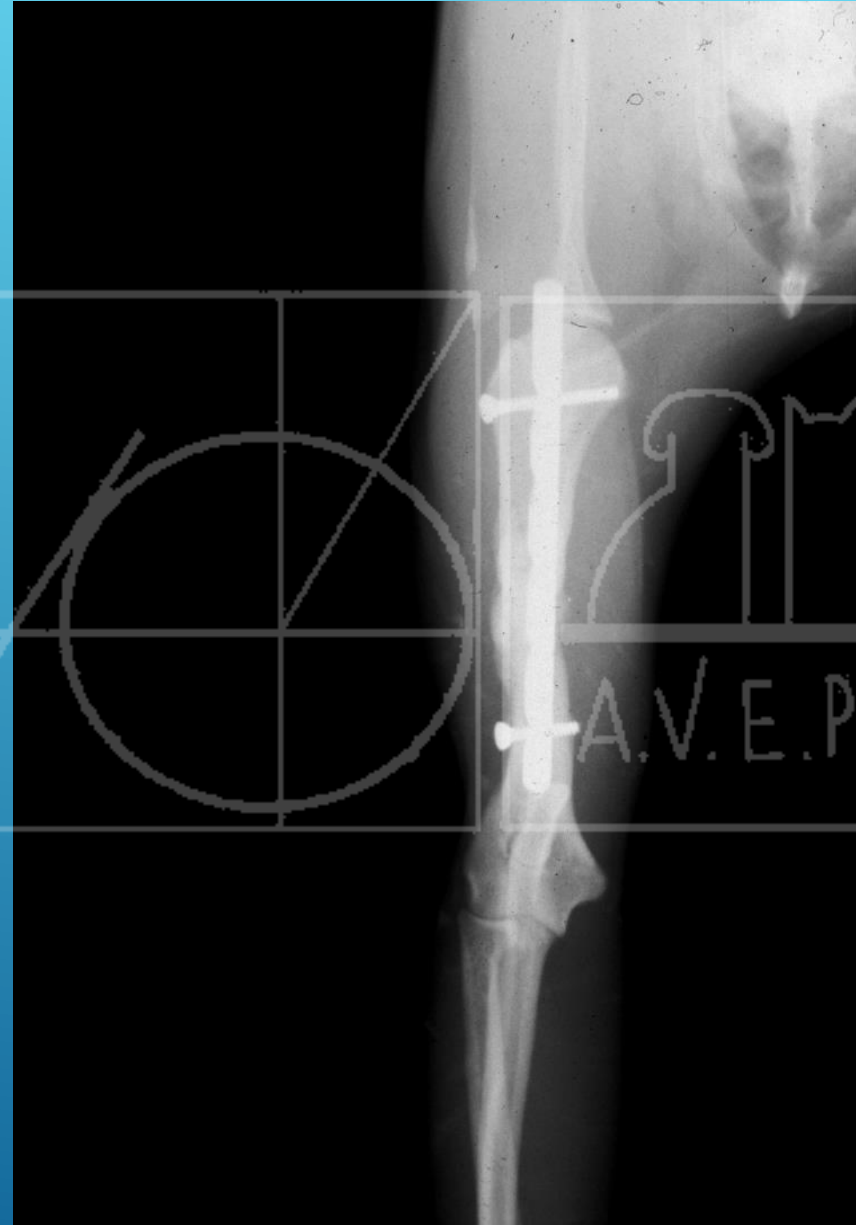
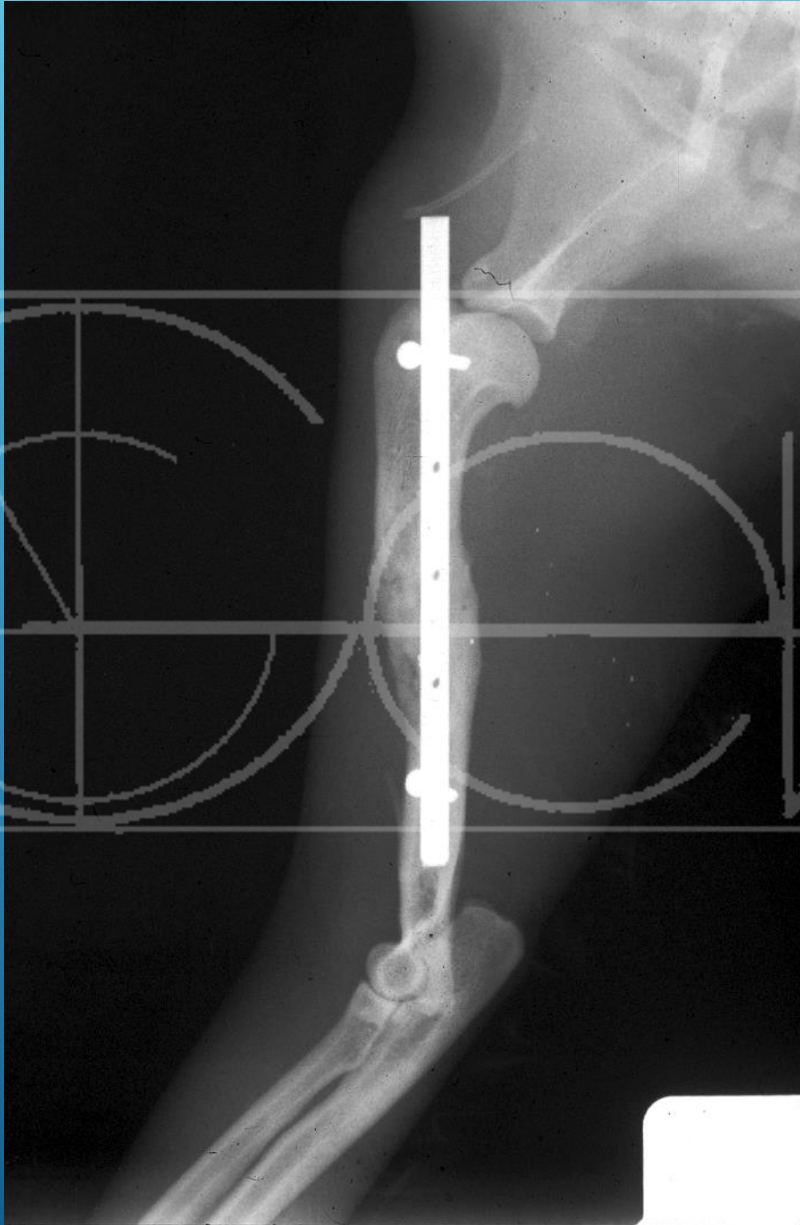


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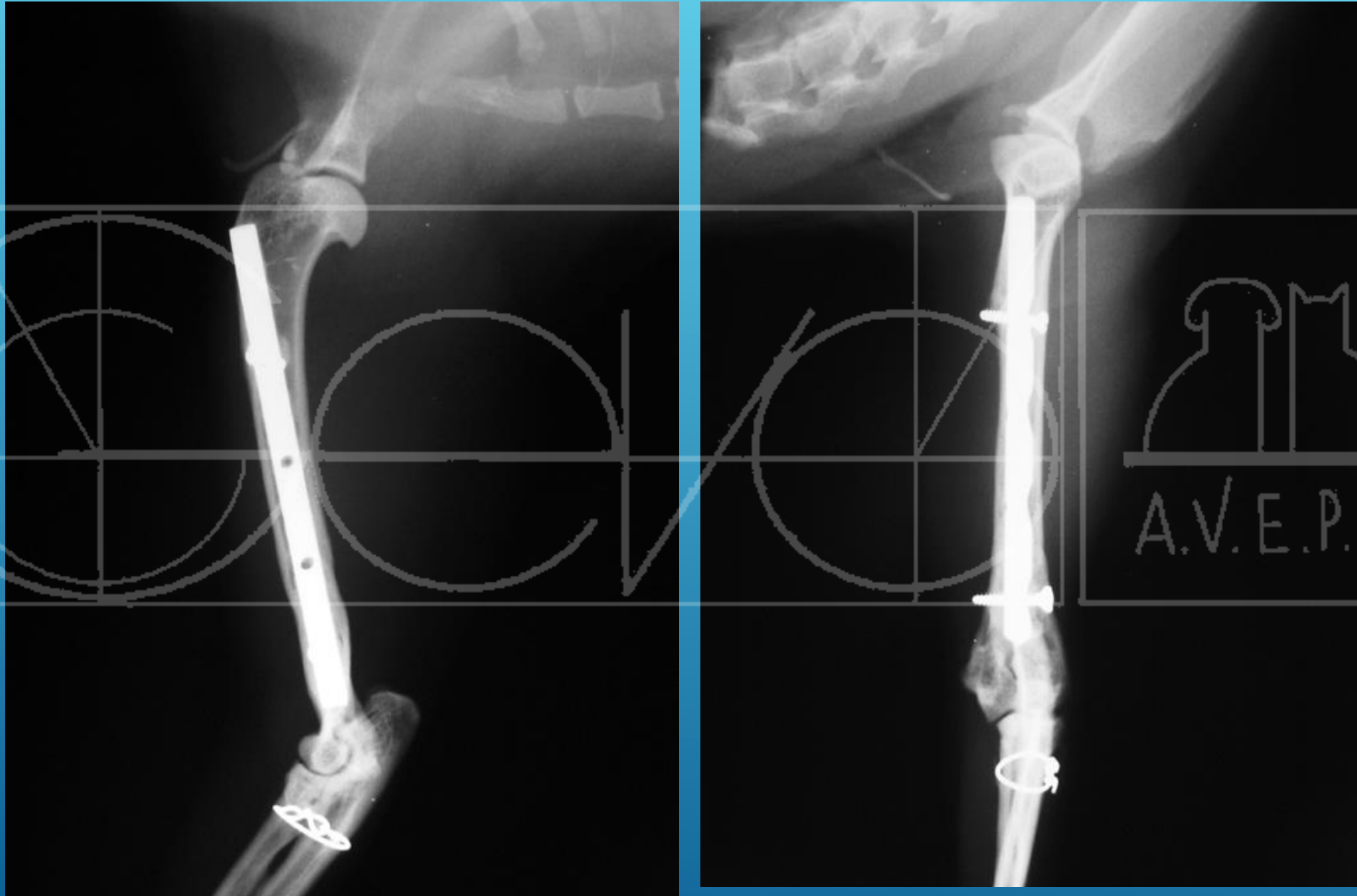




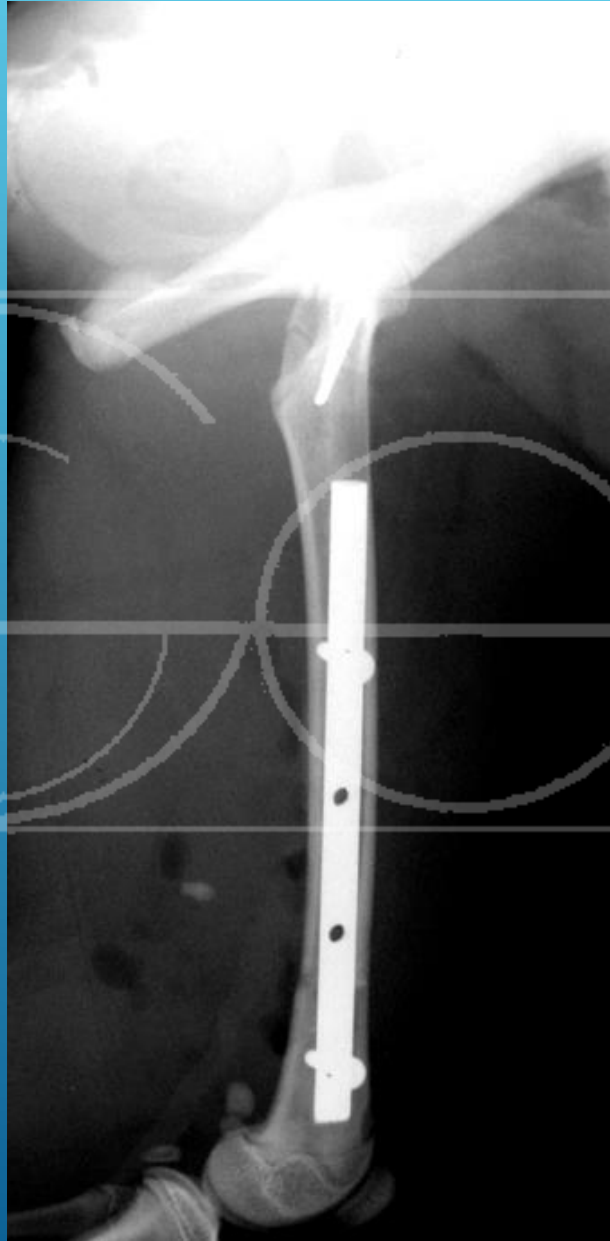


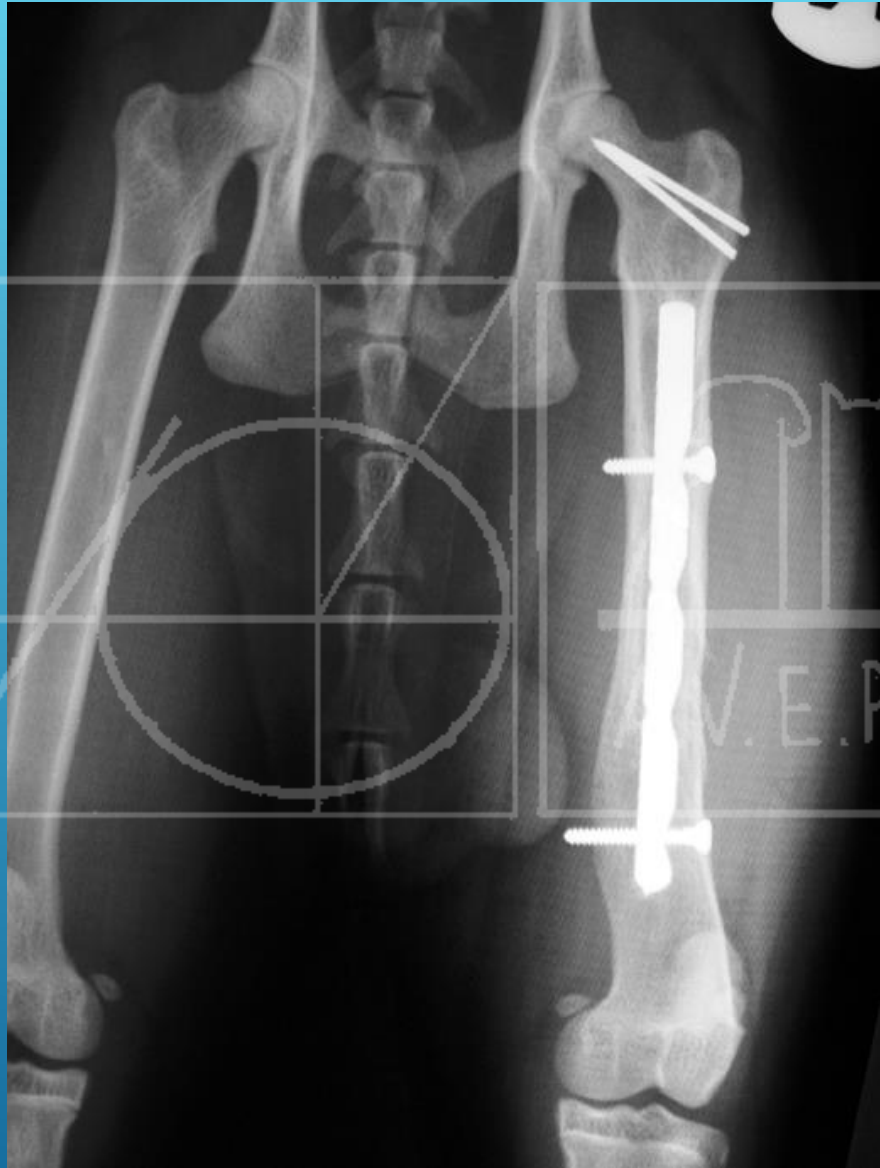
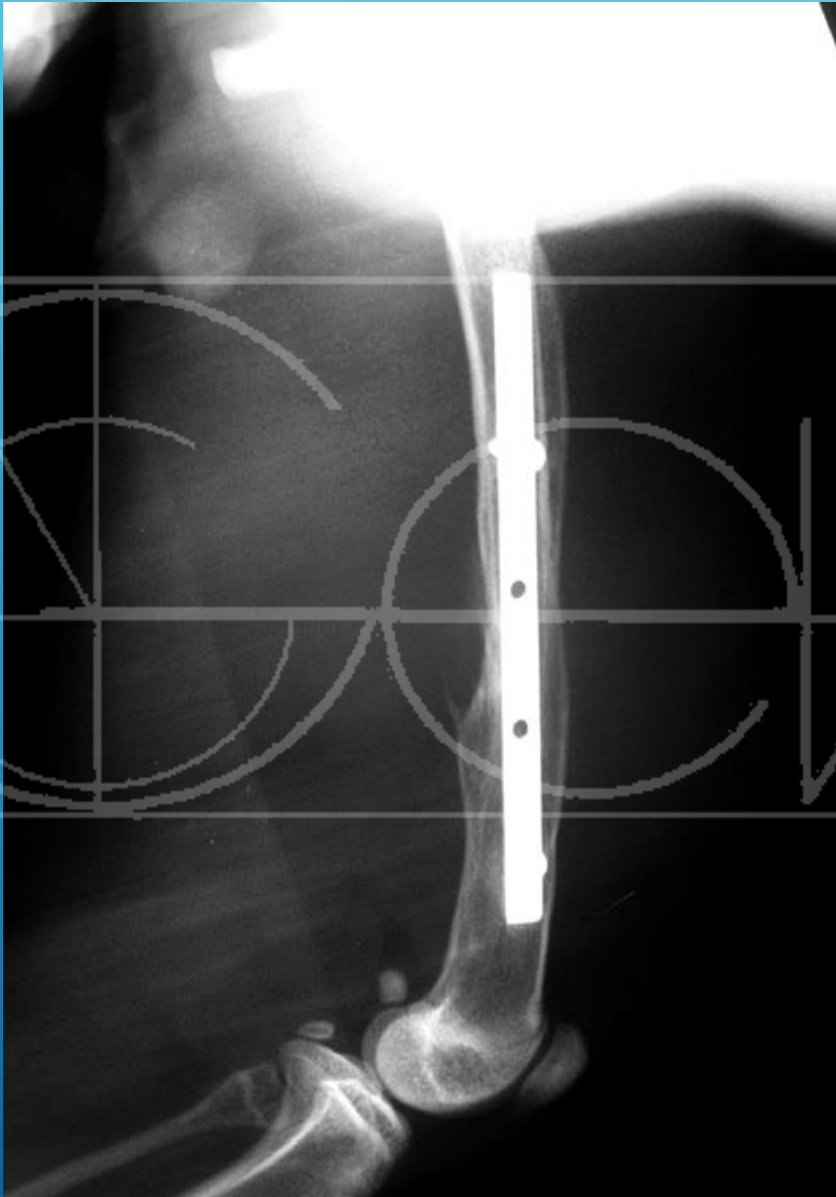












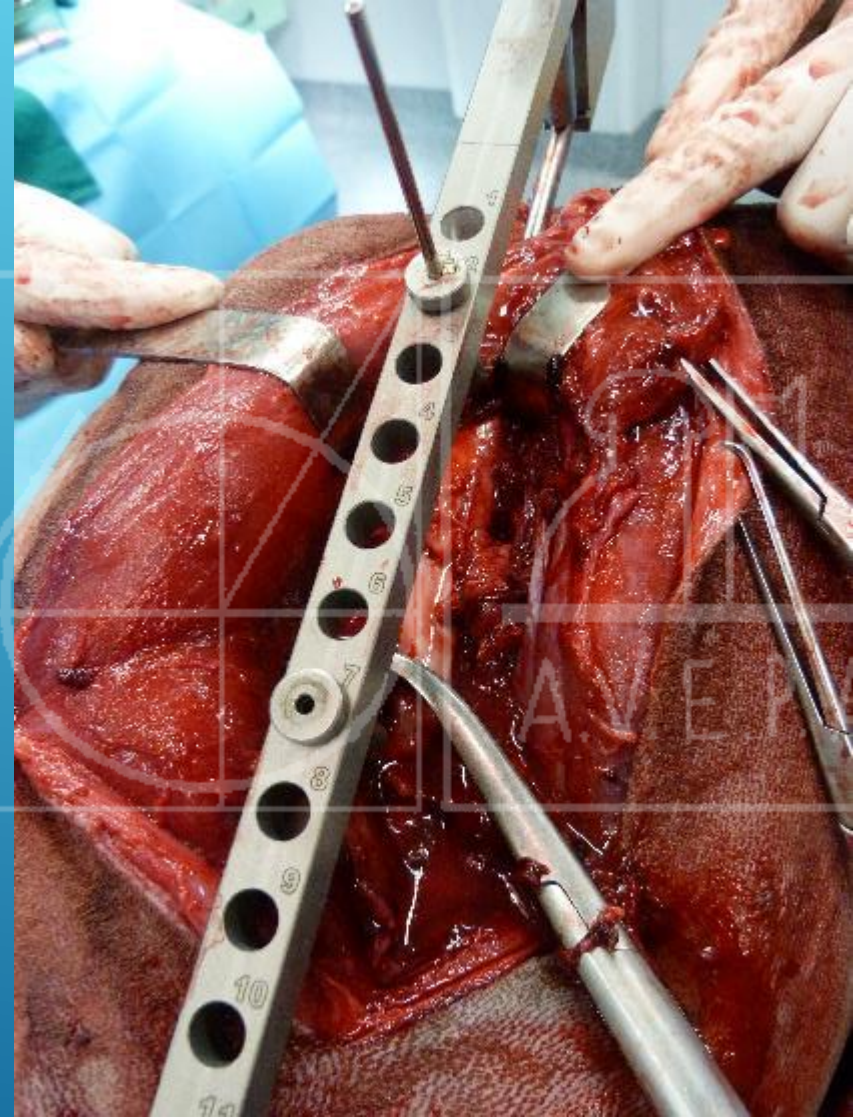
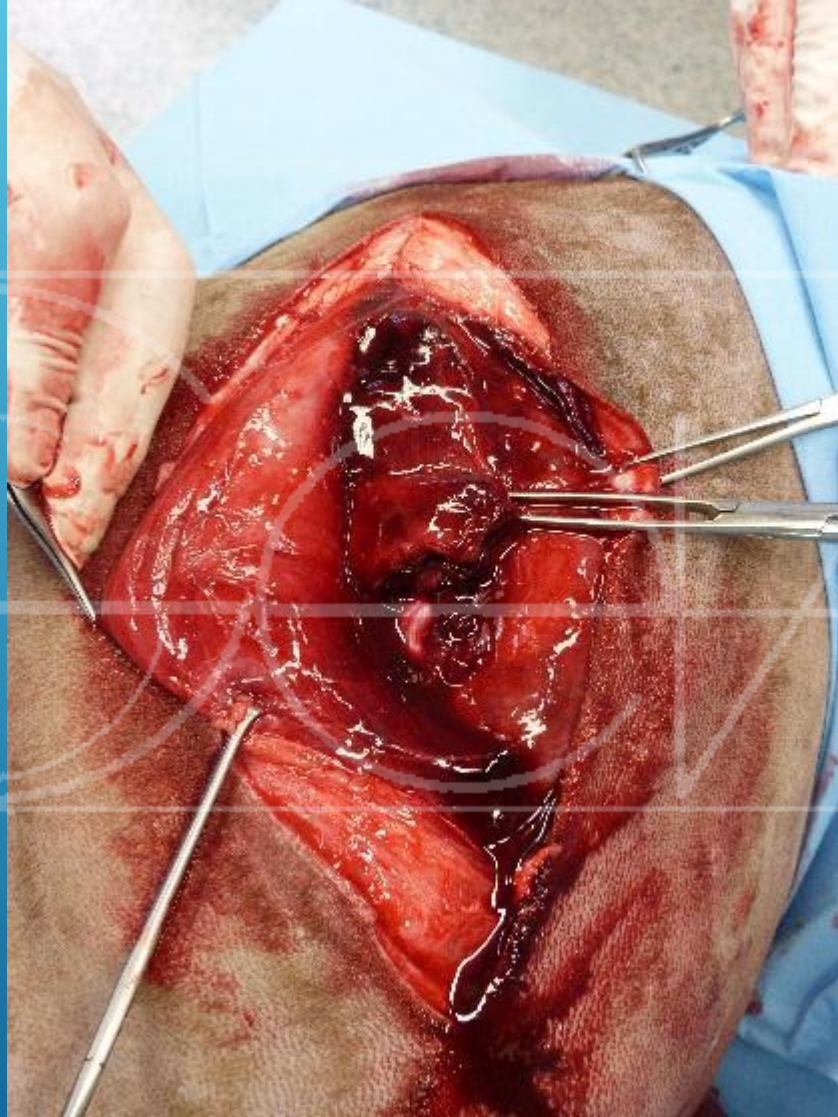
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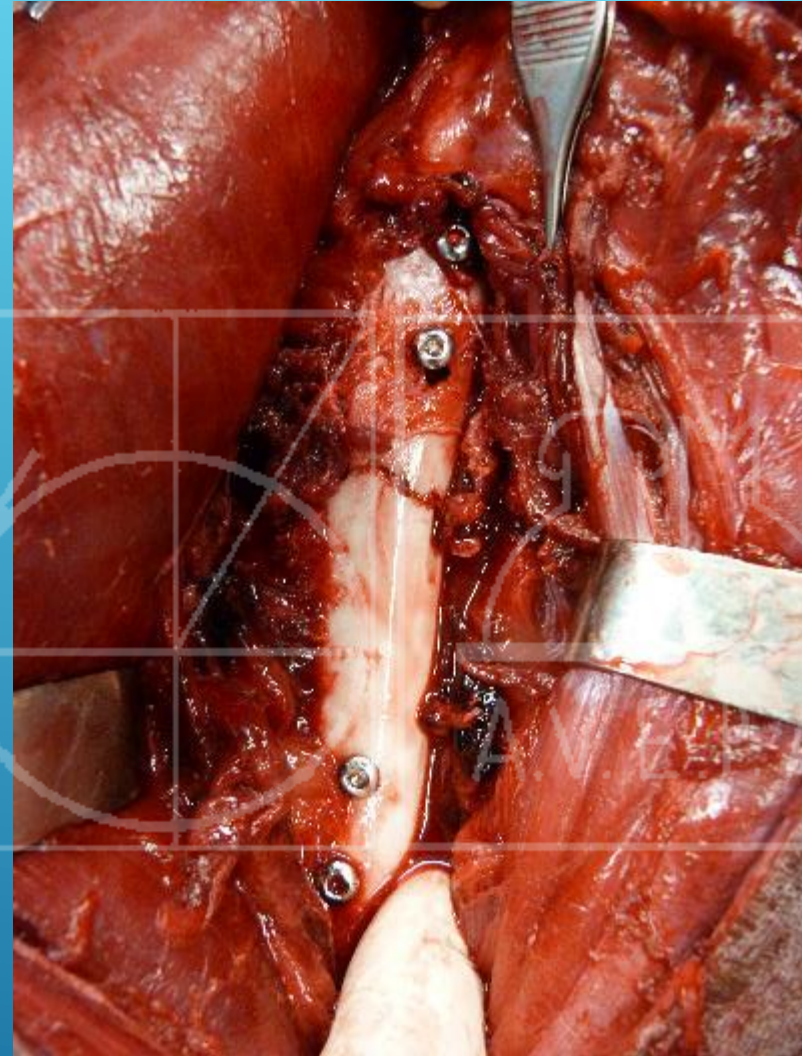
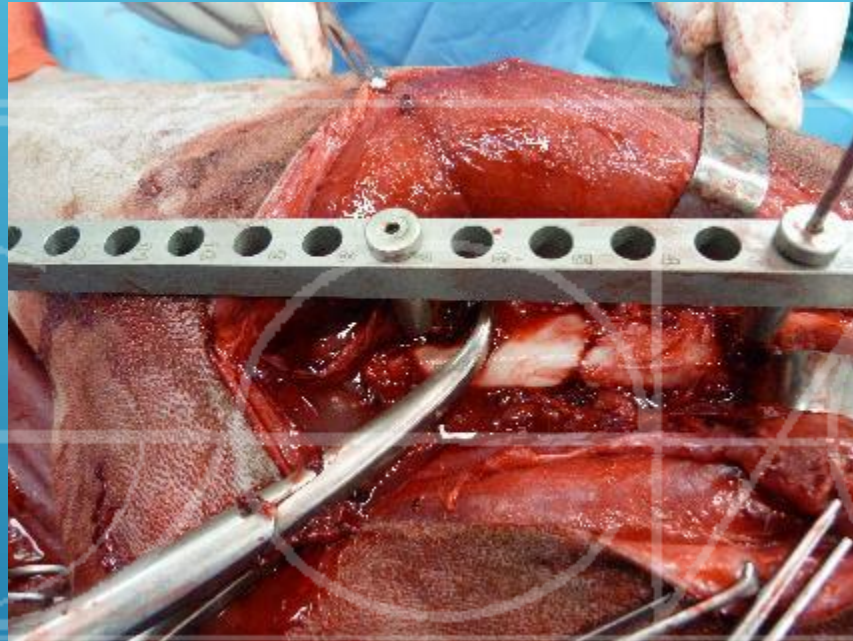
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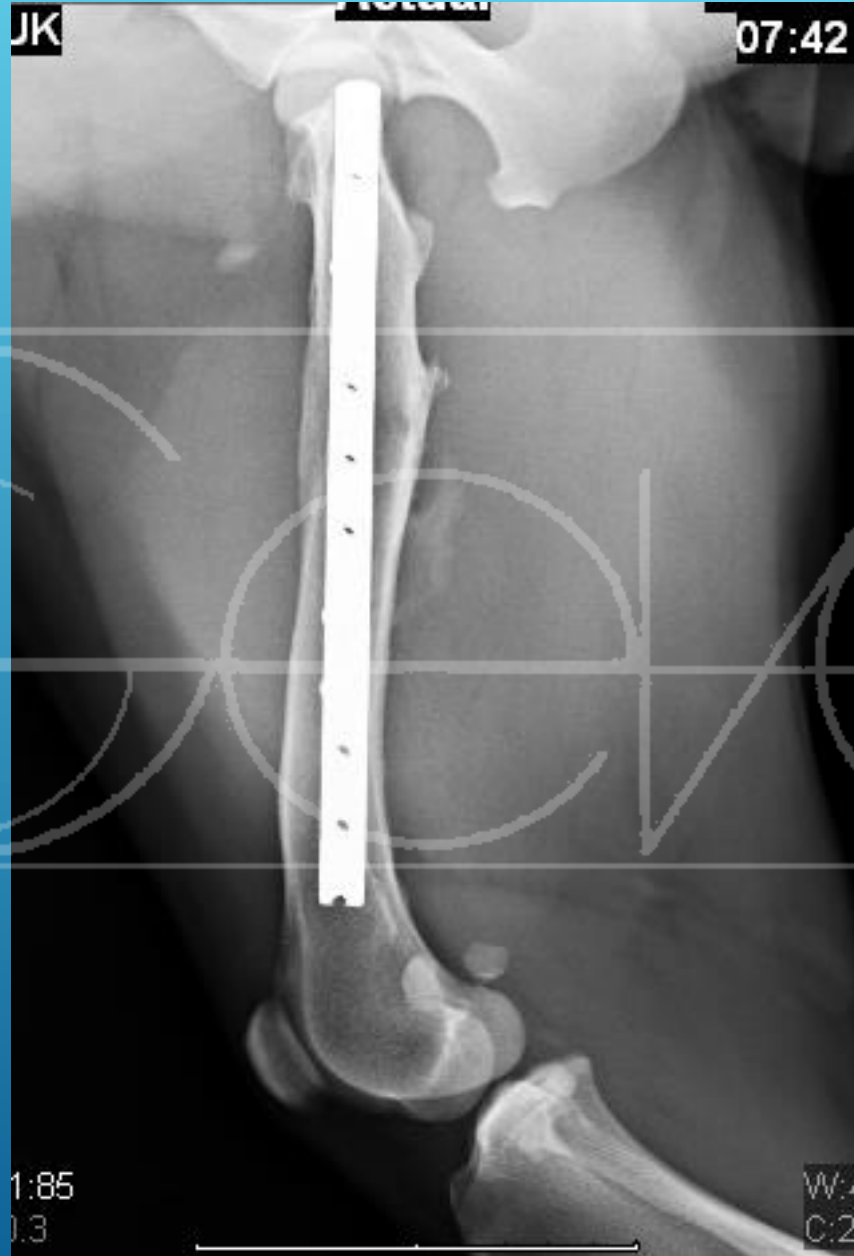
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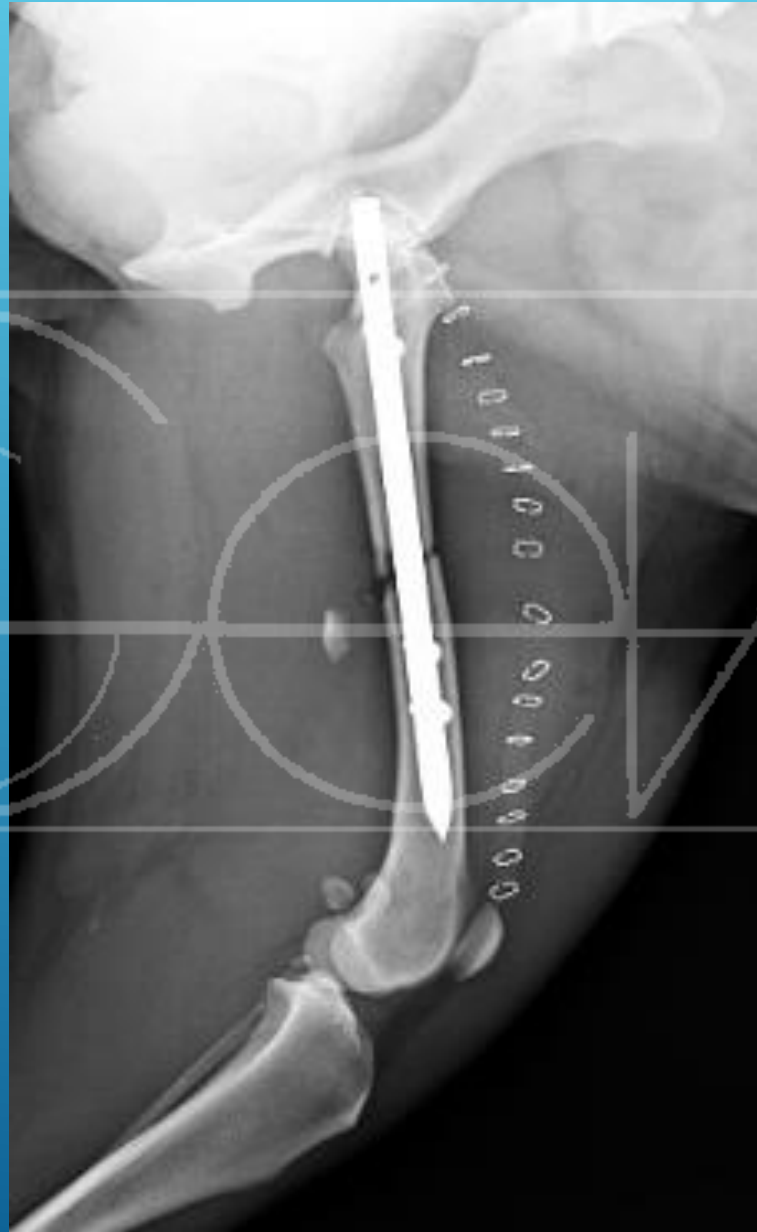
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TAGA



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ANOUK 25-06-2015



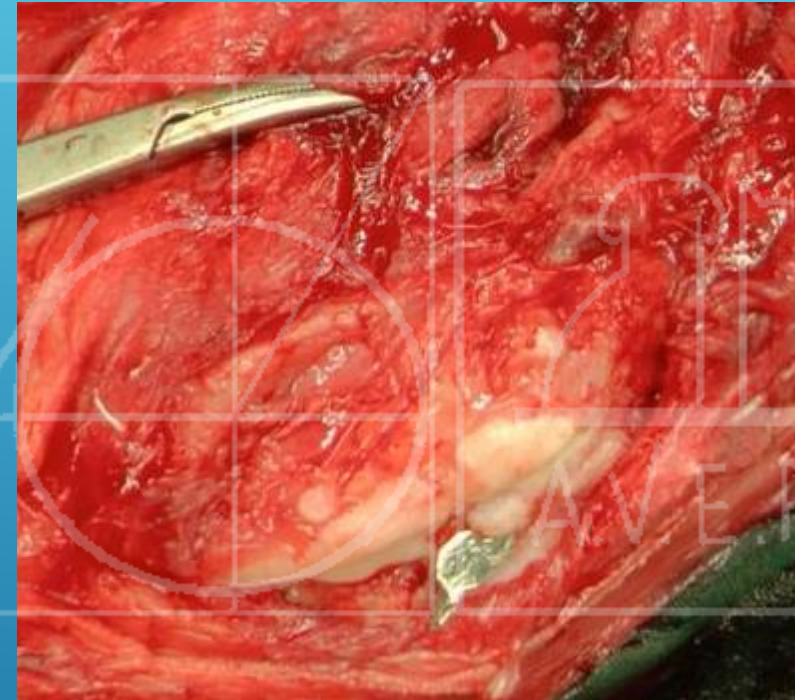
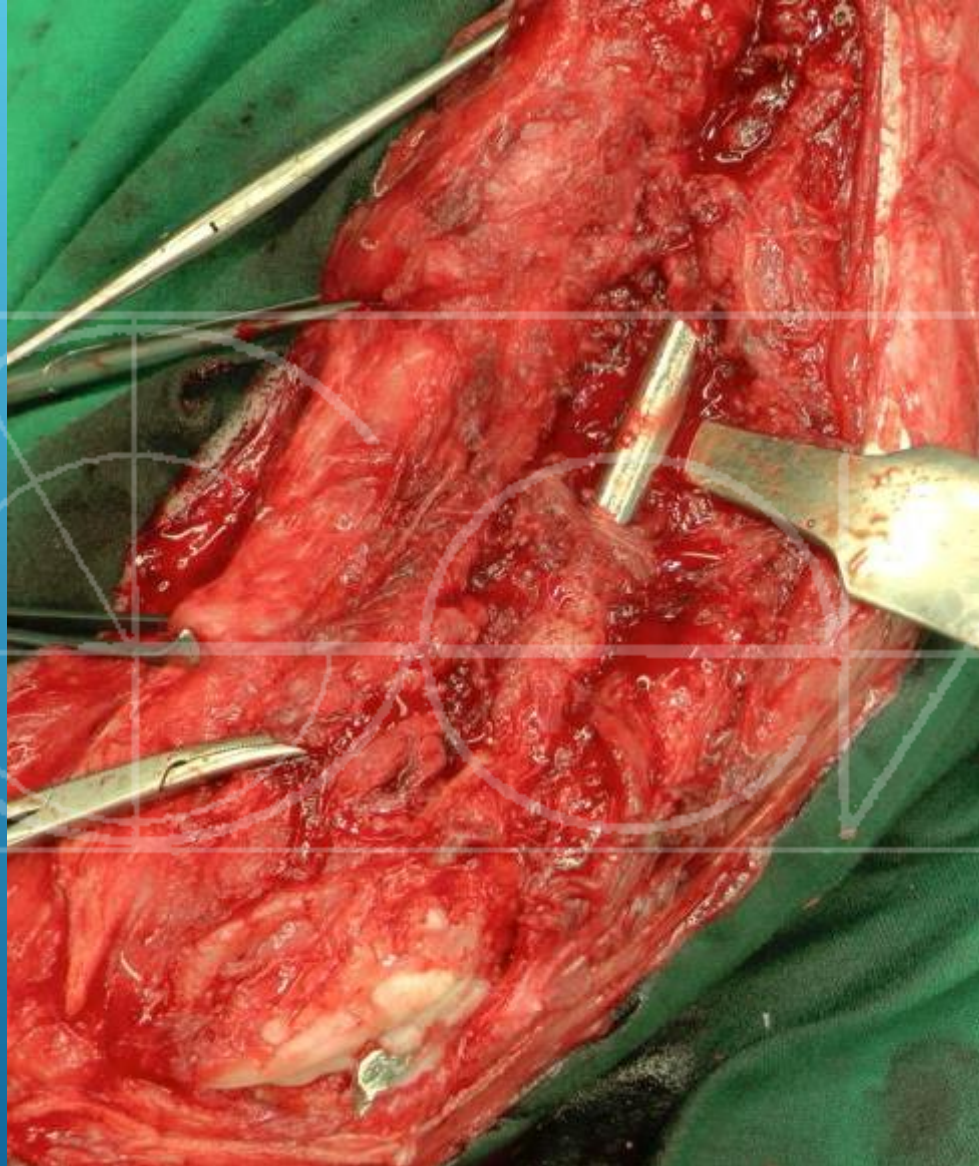
PLACAS DE BLOQUEO DE INSORVET



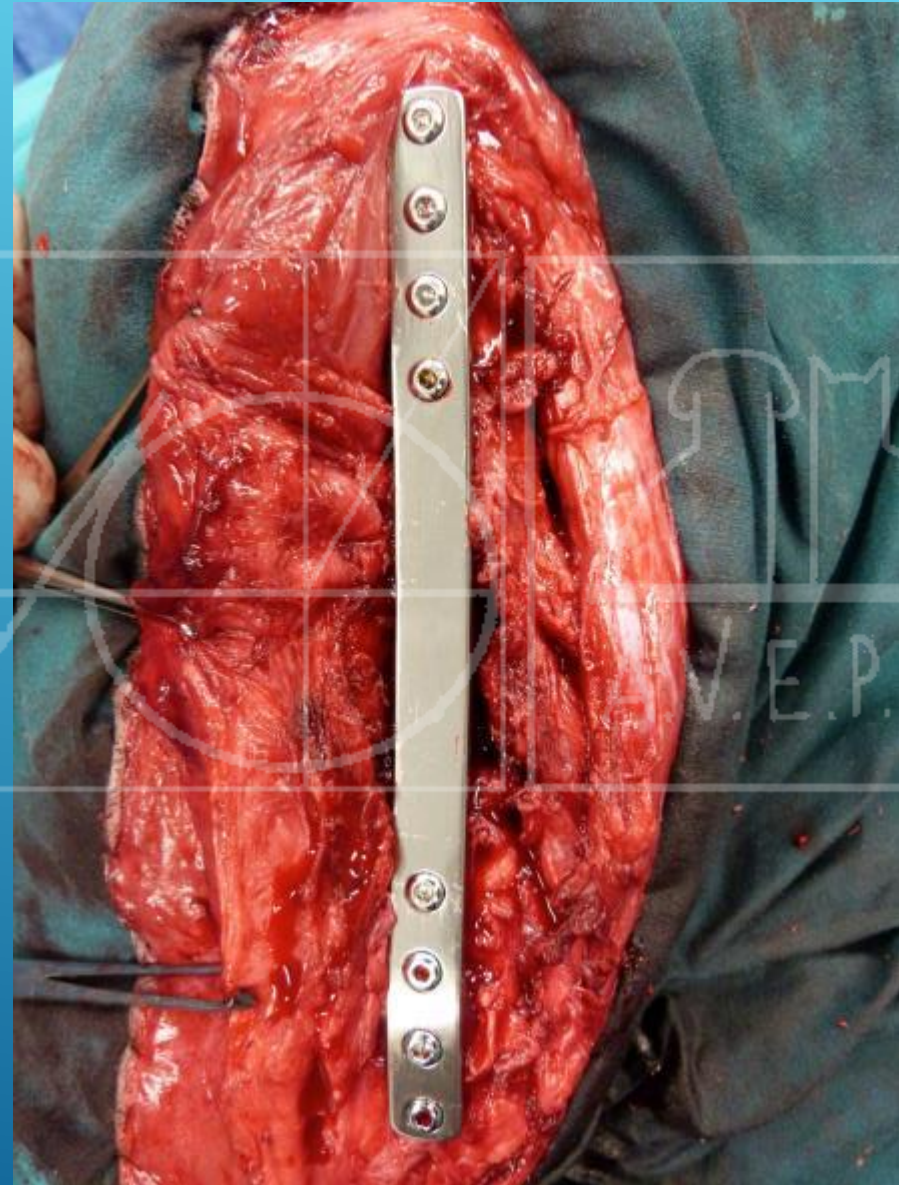
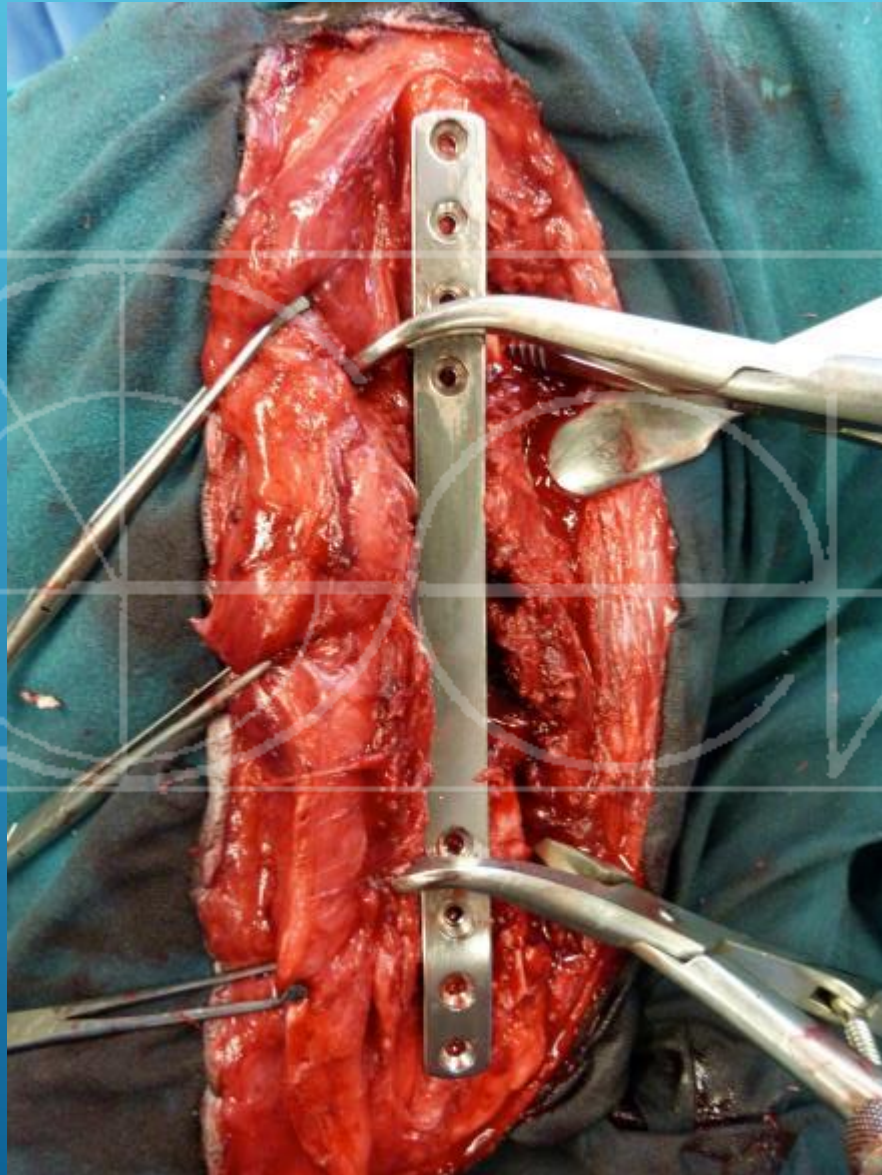
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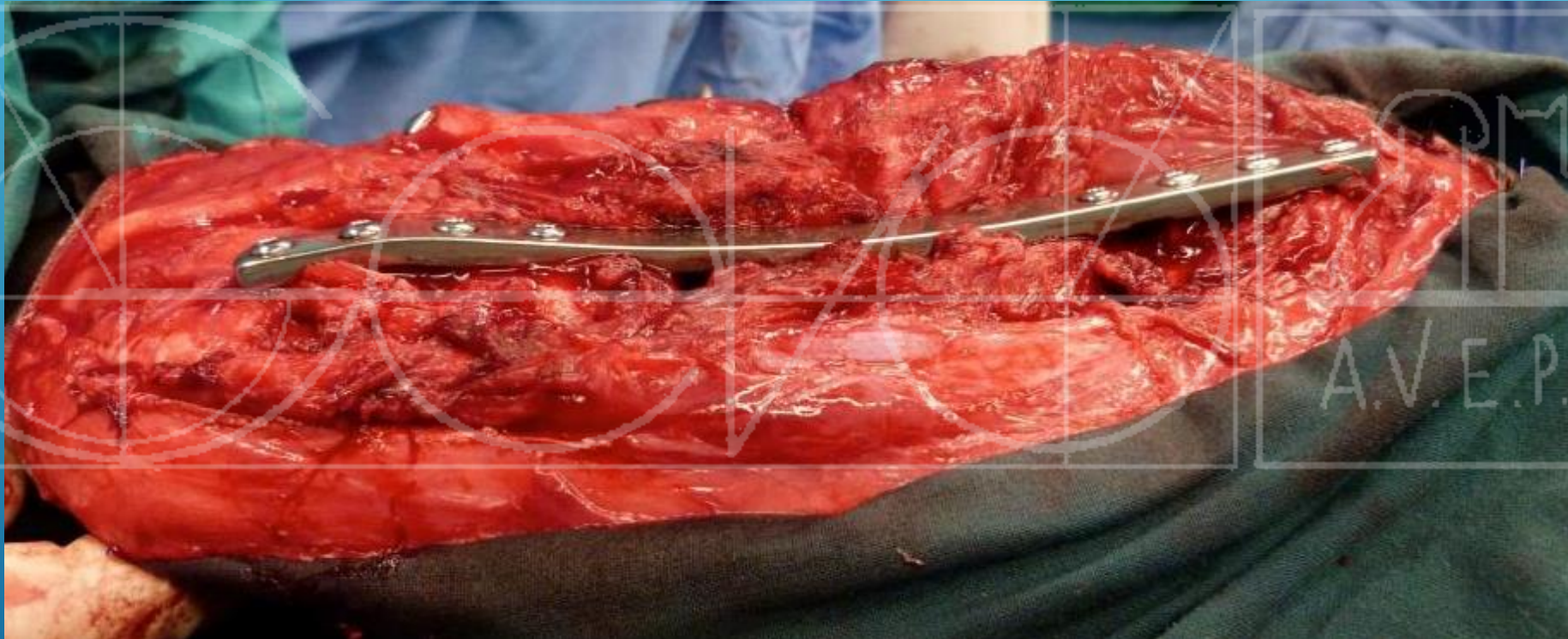
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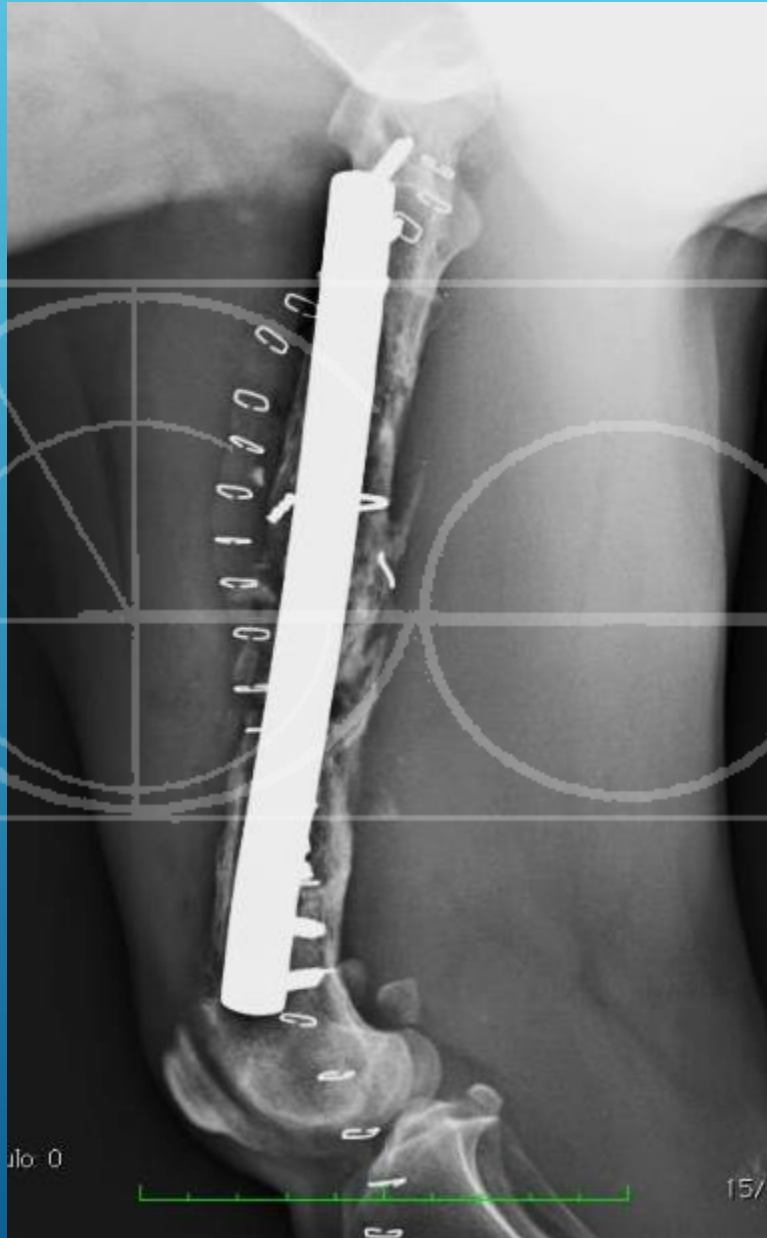
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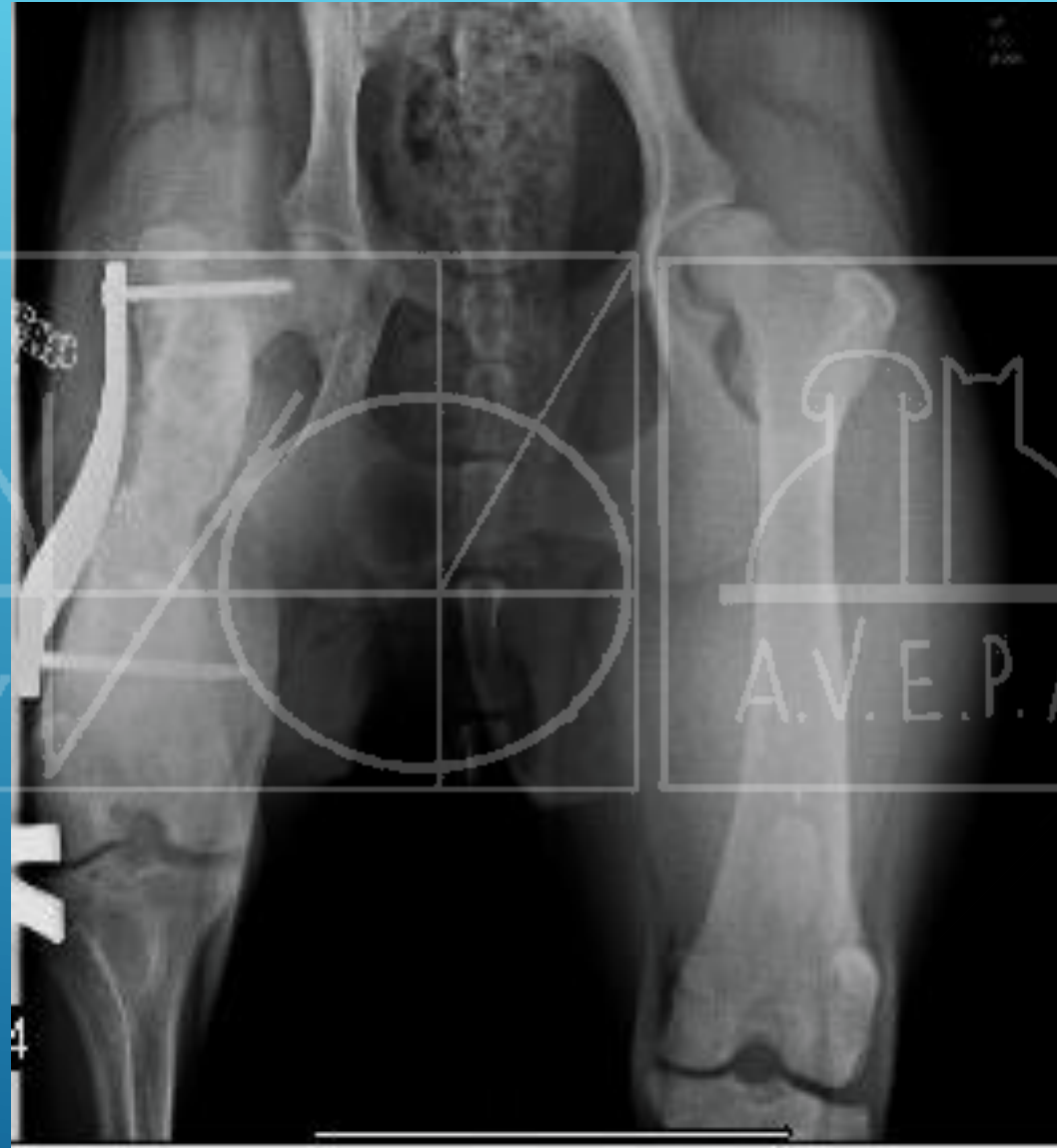
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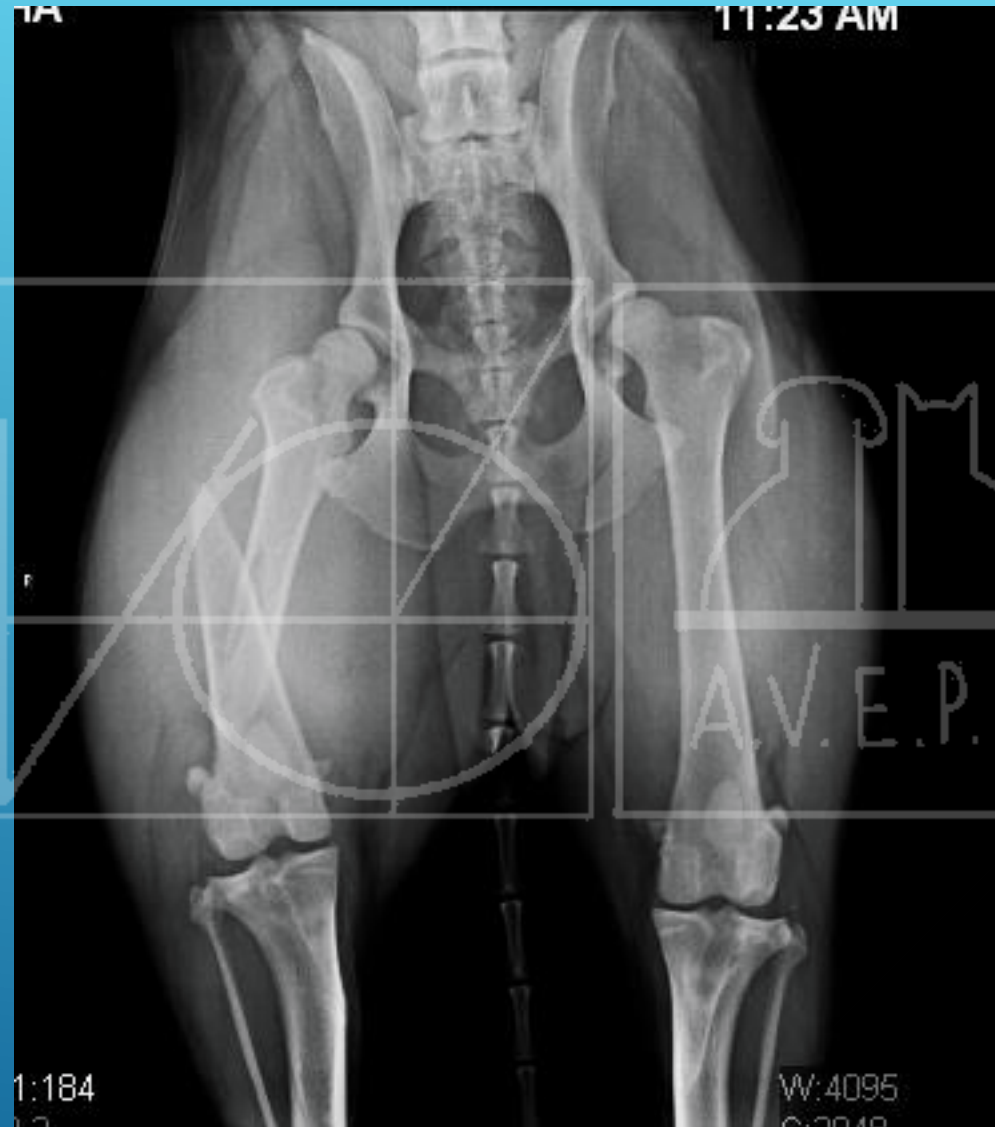


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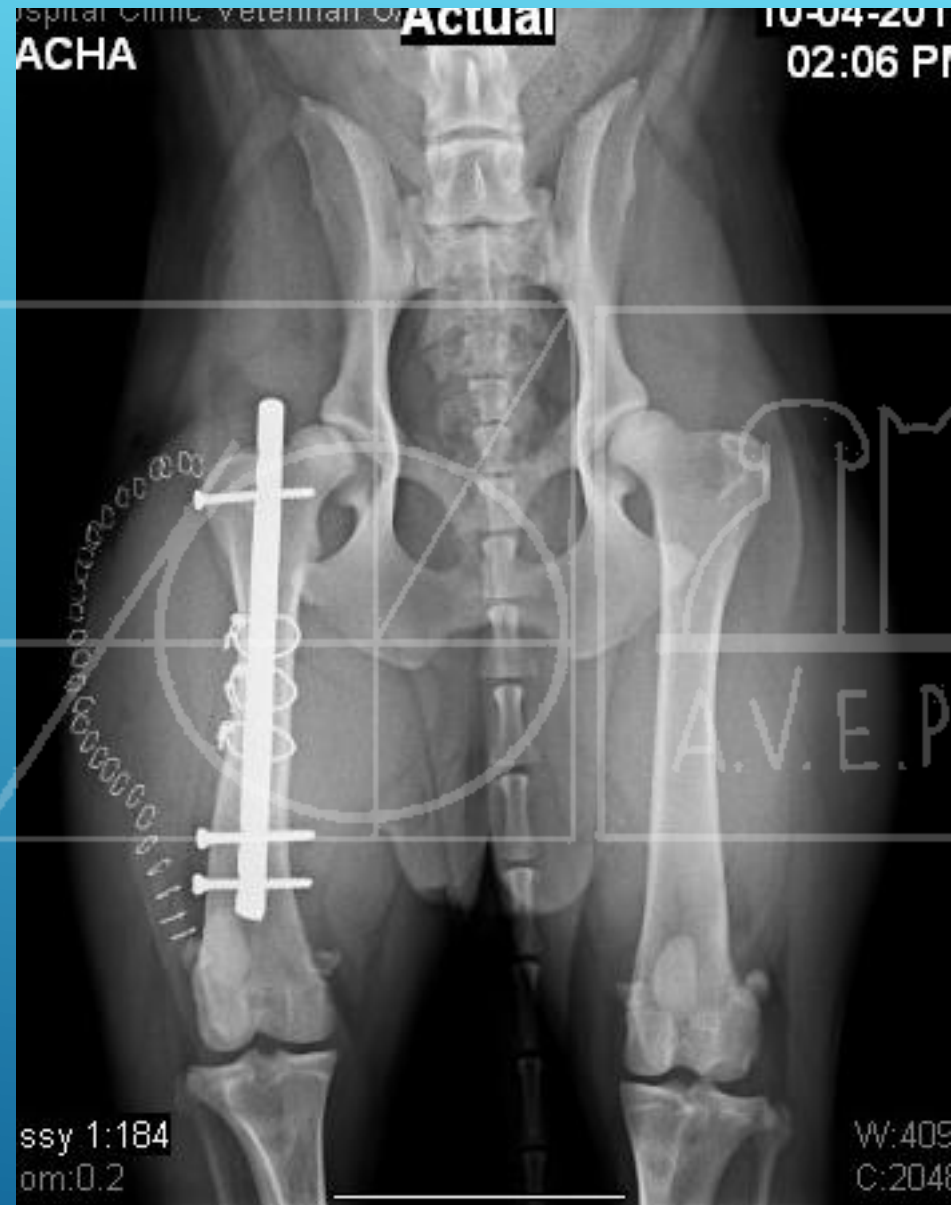


PLACAS DE BLOQUEO DE INSORVET





NACHA 10-4-11



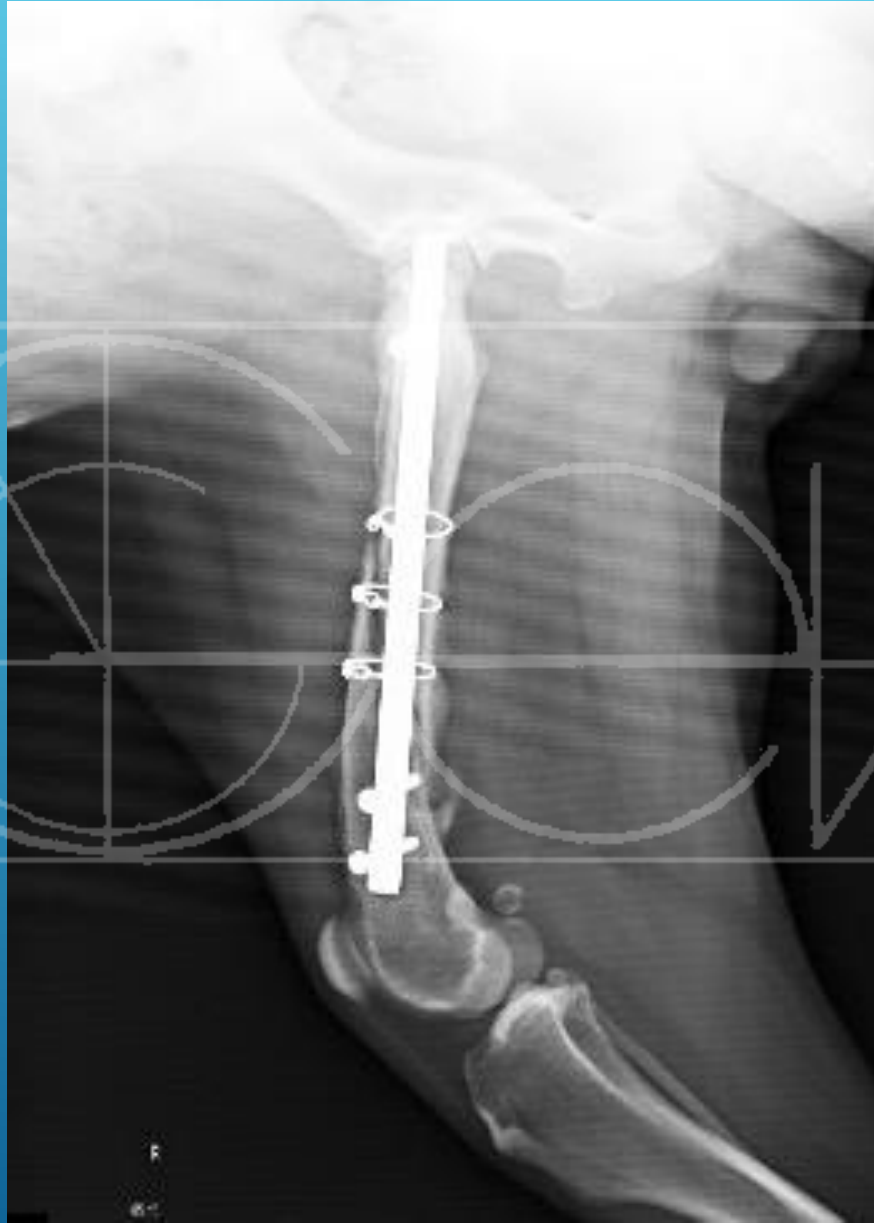
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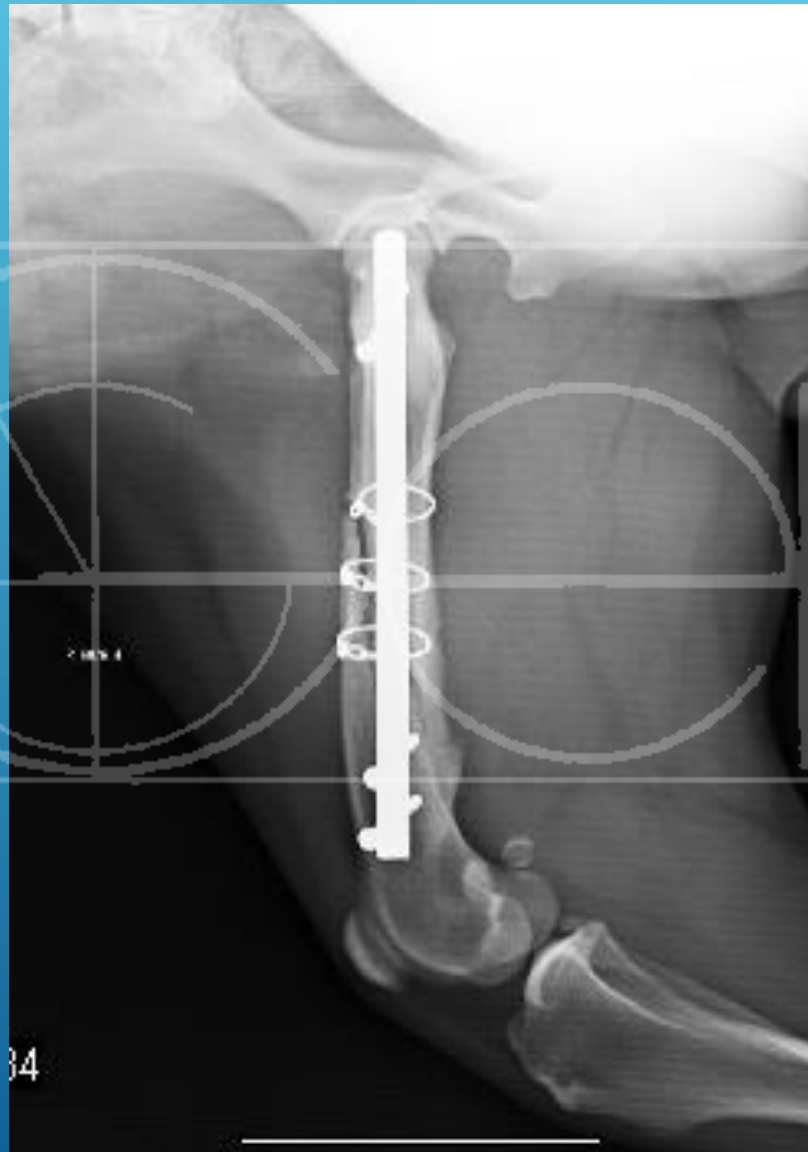


NACHA 19-10-11



NACHA 9-11-11









MUCHAS GRACIAS POR VUESTRA ATENCIÓN