

Ask the Experts: Rapid Fire TKA Early Complication Management



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Disclosures

AAOS: Board or committee member
AJRR: Board or committee member
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Journal of Arthroplasty: Editorial or governing board
Knee Society: Board or committee member
Porosteon: Stock or stock Options
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Yale CORE/CMS: Paid consultant
Zimmer: Paid consultant; Research support



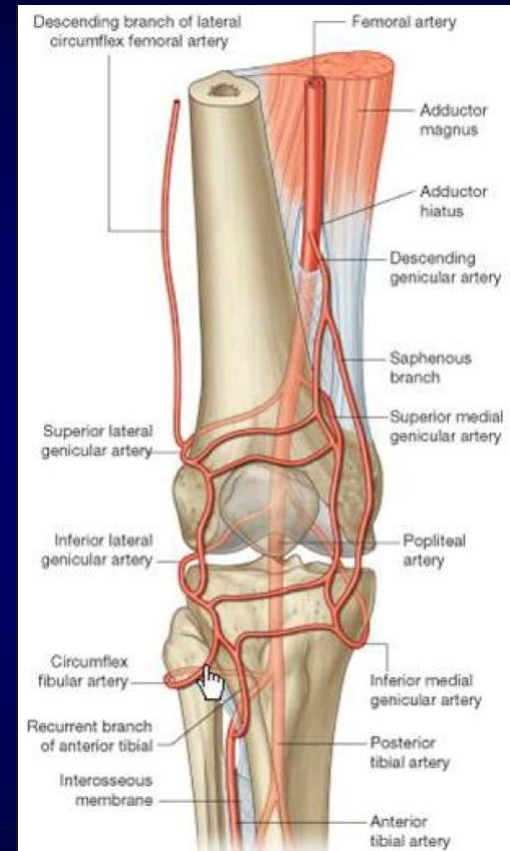
Overview

- Wound problems
- Stiffness
- Instability
- Early loosening
- Infection



Skin Blood Supply

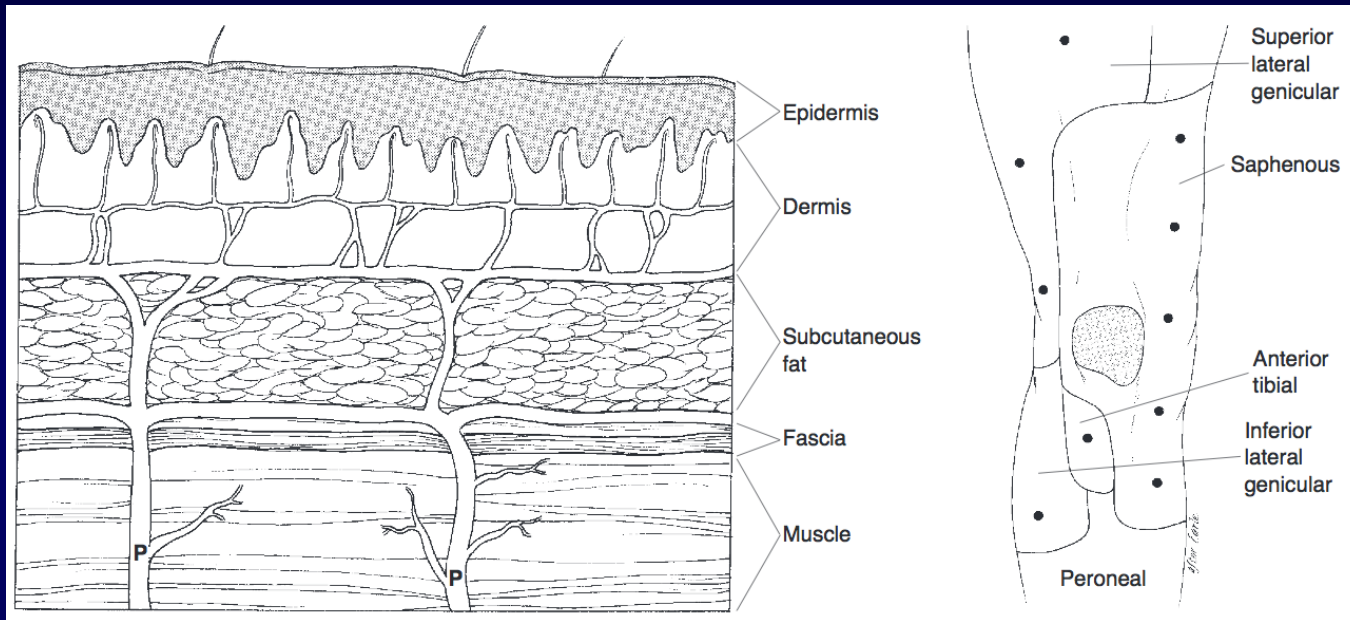
- Intrinsic
 - perforators from superior and inferior genicular systems
- Extrinsic
 - Medial: descending genicular artery (branch of superficial femoral artery)
 - Anterior: recurrent branch of anterior tibial artery
 - Lateral: descending branch of lateral femoral cutaneous artery



Netter



Skin Blood Supply



Surgical Exposures in Revision Total Knee Arthroplasty

*Alastair S. E. Younger, MB, ChB, MSc, FRCSC,
Clive P. Duncan, MB, ChB, MSc, FRCSC, and Bassam A. Masri, MD, FRCSC*

J Am Acad Orthop Surg 1998;6:55-64



Lateral Skin: Lower tcP02

Blood Supply to the Anterior Skin of the Knee - Perioperative Measurement by Transcutaneous Oxygen Tension-

+¹ Koji, A; ²Ikeuchi, M; ²Tomoya K; ²Masashi, I; ²Toshikazu, T
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Poster No. 1229 • *ORS 2011 Annual Meeting*

Tissue Oxygenation, Anemia, and Perfusion in
Relation to Wound Healing in Surgical Patients

Ann. Surg. • November 1991

KENT JONSSON, M.D., Ph.D.,* J. ARTHUR JENSEN, M.D., WILLIAM H. GOODSON, III, M.D., F.A.C.S.,
HEINZ SCHEUENSTUHL, A.B., JUDITH WEST, R.N., M.N., HARRIET WILLIAMS HOPF, M.D.,
and THOMAS K. HUNT, M.D., F.A.C.S., F.R.C.S. (GLASG)

1. Insall JN. Surgical approaches. In: Insall JN, Windsor RE, Scott WN et al, eds. *Surgery of the Knee*. 2nd ed. New York: Churchill Livingstone; 1993: 135-148.



Wound Problem

- 34 yo F s/p PFJ replacement for post-traumatic arthrosis
- Plastics early!



Wound Problem

- 67 yo F s/p primary TKA for post-traumatic arthrosis
- Previous ORIF in her 30s
- 7 cm skin bridge
- Immobilize ?
- VAC ?
- Wet – to – dry drsgs ?
- Abx?



Wound Problem

- 39 yo M primary TKA and ex mech recon w/ mesh 2011 for post-traumatic arthrosis
 - Foot drop from compartment syndrome; hidradenitis on TNF alpha inhibitor
 - No lag, no pain, no assist
 - 2 weeks pain
 - Gross pus
 - Systemically septic - MRSA
-
- 1 stage?
 - 2 stage?
 - Insert exchange?
 - Mesh?



Wound Problem #1

- VAC
- Nylons
- Immobilize
- POD 5
- ? VAC
- ? Flap
- ? nitropaste



Wound Problem

- POD 21



Interesting Case: Knee Arthroplasty

Interesting Case: Knee, 4/9/18

CC: Recurrent Right knee effusions s/p revision Total Knee Arthroplasty

HPI: 61F, multiple knee aspirations with negative infection work-up.

On rifampin and Bactrim since last surgery 12/19/17 (4 months ago)

OSH ID service planning on 6 months of abx total.

She has moderate pain with activities, stairs, kneeling, low chairs, any exercise.

PSH: extensive (see detail next slide)

PMH: BCC, hx intestinal obstructions, Hx DVT 1980's, distant history of gastroschisis

Meds: Bactrim, progesterone, meloxicam, tramadol PRN

ALL: NKDA

FH: Non-contributory

SH: VP at an international publishing company. Social drinker. Quit smoking in the 90's.

Interesting Case: Knee, 4/9/18 Extensive Hx surgery Right knee: all at OSHs

PSH: Distant **HTO**, 1990's

12/10/04 R knee open meniscectomy, debridement, chondroplasty

3/17/06 R TKA, OSH -> MUA 5/18/06

11/6/06 R knee lysis of adhesion, poly exchange, **TTO** re-alignment

11/20/06 R knee **DAIR (MSSA)** -> MUA 12/18/06 -> c/b wound problem

12/25/06 R knee I and D and complex wound closure -> MUA 3/5/07

12/20/13 R knee arthroscopic lysis of adhesions

10/9/14 R knee revision TKA and **revision TTO**

2015-2016 serial aspirations for recurrent effusions

4/17/2017 R knee resection arthroplasty, ROH HTO staple and screws, static abx spacer

(MRSA)

6/29/2017 R revision TKA, c/b patellar tendon rupture repaired primarily with fiberwire
c/b instability -> persistent effusions

12/5/2017 R revision TKA -> **hinge**, sleeves and tibial component retained,
c/b draining hematoma, bleeding, & wound problem

12/20/17 R knee I&D, liner exchange, and revision capsular closure (rent about the
tubercle)

Interesting Case: Knee, 4/9/18

XR:



Interesting Case: Knee, 4/9/18

Exam: Well-nourished, well-developed, NAD

5'6", 125lbs (BMI: 20)

Antalgic gait, trendelenberg negative

wound well-healed, 2+ effusion, not red or warm

neutral alignment, ROM 0-115 with some discomfort

palpable patellofemoral crepitus, no instability

PPP, SILT, good strength throughout

Plan: ???

Interesting Case: Knee, 4/9/18

Exam: Well-nourished, well-developed, NAD

5'6", 125lbs (BMI: 20)

Antalgic gait, trendelenberg negative

wound well-healed, 2+ effusion, not red or warm

neutral alignment, ROM 0-115 with some discomfort

palpable patellofemoral crepitus, no instability

PPP, SILT, good strength throughout

Plan: Aspiration, cell count, culture, alpha-defensin

Agree with plan to continue abx to 6 months

Follow-up in 2 months or sooner PRN

Procedure: aspirated 240cc of blood-tinged fluid

	wbc	pmn	a-def	Cx
4/9/18	33	30	neg	NG14d

Interesting Case: Knee, 5/21/18

RTC 6wk

CC: requesting re-aspiration for symptomatic relief

HPI: after aspiration was able to increase her activity level, do Pilates, and golf.
weaning tramadol, tolerating Bactrim
unfortunately effusion re-accumulated a couple weeks after aspiration

Exam: same 2+ effusion

Plan: ???

Interesting Case: Knee, 5/21/18

RTC 6wk

CC: requesting re-aspiration for symptomatic relief

HPI: after aspiration was able to increase her activity level, do Pilates, and golf.
weaning tramadol, tolerating Bactrim
unfortunately effusion re-accumulated a couple weeks after aspiration

Exam: same 2+ effusion

Plan: Aspirate knee

Stay the course with OS ID service

RTC PRN

Procedure: aspirated 210cc of blood-tinged fluid

	wbc	pmn	a-def	Cx
4/9/18	33	30	neg	NG14d
5/21/18	56	39	neg	NG14d

Interesting Case: Knee, 6/6/18

3 weeks later, presents to partner's clinic

CC: Right hip and groin pain.

HPI: Groin pain pain with activity, stairs one-at-a-time, refractory to NSAIDs

Exam: Groin pain with hip IR

XR:

LABS:

ESR: 14 (nl<30)

CRP: <0.2 (<0.9)

PLAN: ???



Interesting Case: Knee, 6/6/18

3 weeks later, presents to partner's clinic

CC: Right hip and groin pain.

HPI: Groin pain with activity, stairs one-at-a-time, refractory to NSAIDs

Exam: Groin pain with hip IR

XR:

LABS:

ESR: 14 (nl<30)

CRP: <0.2 (<0.9)

PLAN: Aspirate

Wbc 5, 54%

A-def neg

Consult ID

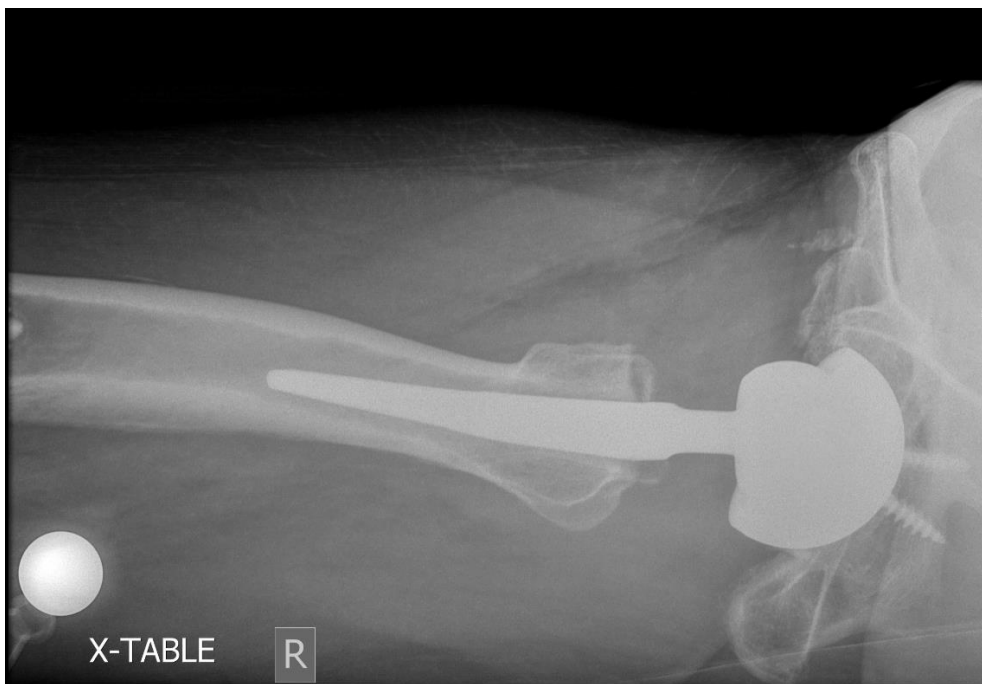


Interesting Case: Knee, 7/18/18

Routine R THA w press-fit implants 7/18/18

Routine recovery, except persistent Right knee effusions, aspirated 8/27/18

Discontinued Bactrim 10/5/18



IS AND HIP 1 VIEW RIGHT

F

W: 4096.0, L: 2048.0



Interesting Case: Knee, 11/19/18

CC: Recurrent Right knee effusions

Exam: 2+ effusion

ROM 0-100, no instability

5 degree extensor lag

Plan: ???

Interesting Case: Knee, 11/19/18

CC: Recurrent Right knee effusions

Exam: 2+ effusion

ROM 0-100, no instability

5 degree extensor lag

Plan: Defer aspiration

Consult with IR

Interesting Case: Knee, 1/15/19

CC: Recurrent Right knee effusions

Exam: 2+ effusion

ROM 0-110, no instability

5 degree extensor lag

Plan: ???

Interesting Case: Knee, 1/15/19

CC: Recurrent Right knee effusions

Exam: 2+ effusion

ROM 0-110, no instability

5 degree extensor lag

Plan: Open synovectomy and liner exchange.

interval aspiration for symptomatic relief.

	cc	date	wbc	pmn	a-def	Cx
	240	4/9/18	33	30	neg	NG14d
	210	5/21/18	56	39	neg	NG14d
	160	7/10/18	196	38	nd	NG14d
stopped Bactrim		10/5/18				
	200	8/27/18	discarded			
	150	1/15/19	discarded			

Interesting Case: Knee, 5/22/19 open synovectomy, insert exchange

OR:

Synovial fluid: typical blood-tinged appearance, wbc 25

Mature, thick synovium, no synovitis

Well fixed implants

Liner exchange

WBAT, HKB LIE



Interesting Case: Knee, 6/6/19

2 weeks post-op, no effusion



Interesting Case: Knee, 7/9/19

6 weeks post-op (7/9/19)

2+ effusion, 105cc

10 degree extensor lag

4 months post-op (9/23/19)

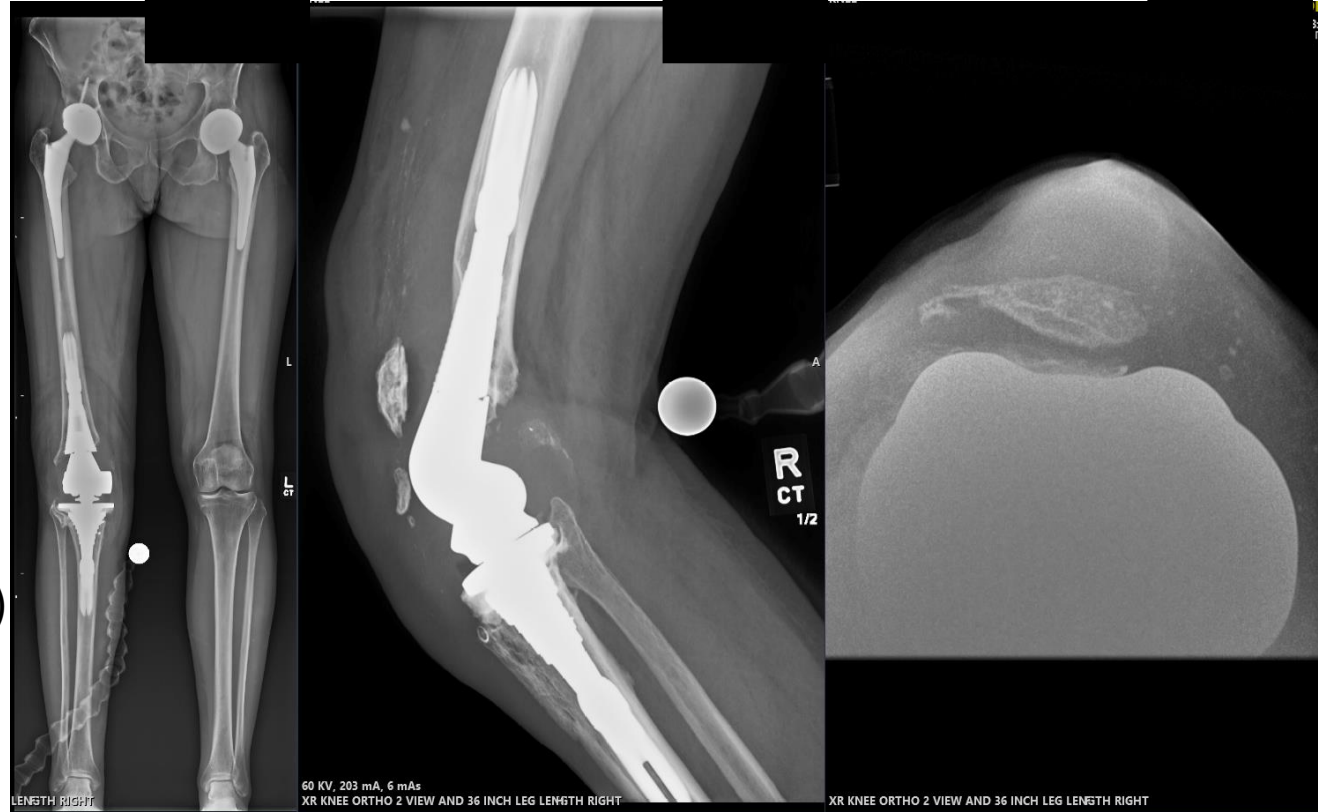
2+ effusion, 260cc

20 degree extensor lag

6 months post-op (11/19/19)

2+ effusion, 420cc

No extensor lag noted



Plan: ???

Interesting Case: Knee, 7/9/19

6 weeks post-op (7/9/19)

2+ effusion, 105cc

10 degree extensor lag

4 months post-op (9/23/19)

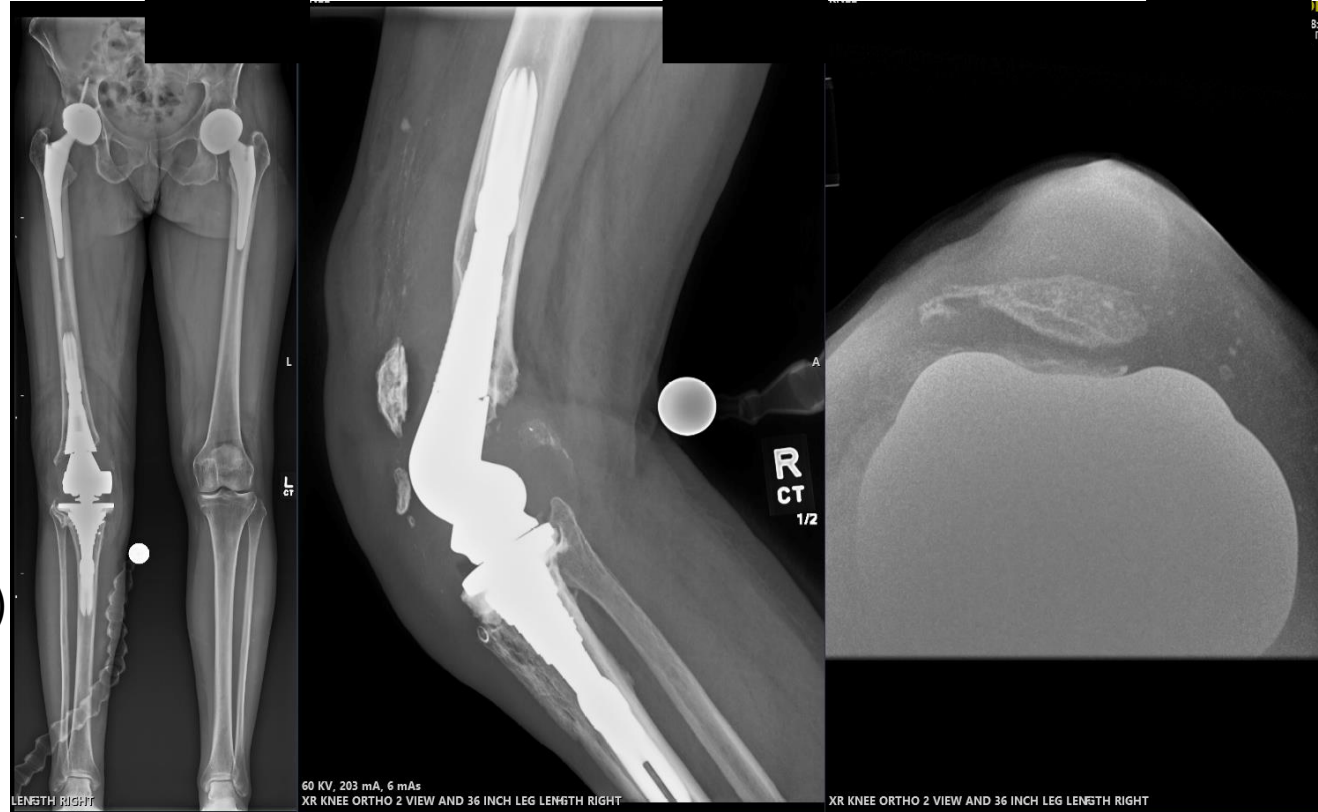
2+ effusion, 260cc

20 degree extensor lag

6 months post-op (11/19/19)

2+ effusion, 420cc

No extensor lag noted



Plan: 12/16/19 IR embolization of superior and descending geniculate arteries

Interesting Case: Knee, 1/6/20

RTC

CC: recurrent knee effusions

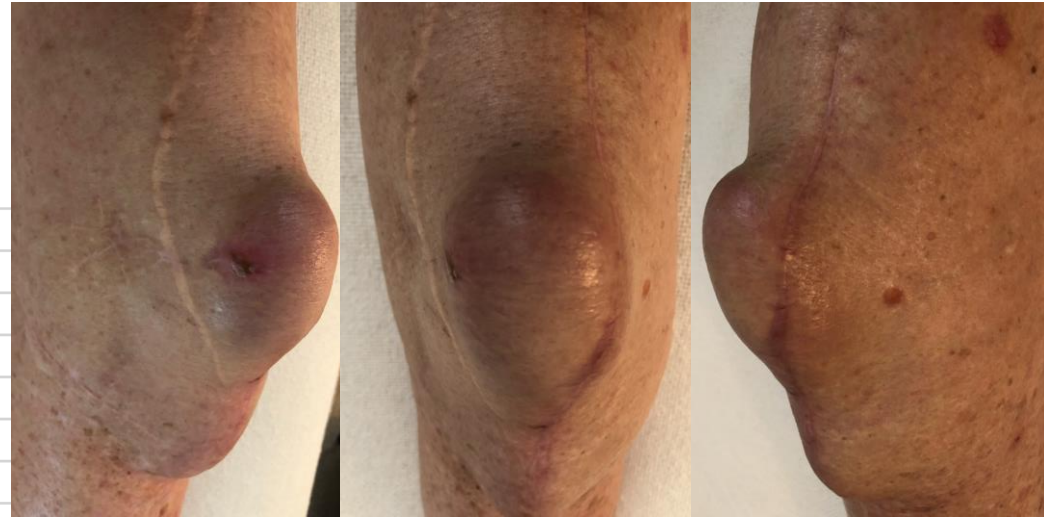


Interesting Case: Knee, 1/6/20

RTC

CC: recurrent knee effusions

Labs: ESR 9 (nl<30), CRP 1(nl<8)



	cc	date	wbc	pmn	a-def	Cx	
	240	4/9/18	33	30	neg	NG14d	
	210	5/21/18	56	39	neg	NG14d	
	160	7/10/18	196	38	nd	NG14d	
stopped Bactrim		10/5/18					
	200	8/27/18	discarded				
	150	1/15/19	discarded				
open synovectomy		5/22/19					
	n/a	5/22/19	23	72	nd	NG14dx5	
	105	7/9/19	discarded				
	260	9/23/19	83	45	neg	NG14d	80 prepatellar, 180 intra-articular
	420	11/19/19	189	30	neg	NG14d	
IR embolization		12/16/19					
	450	12/16/19	discarded				
	305	12/21/19	discarded				55 prepatellar, 250 intra-articular

Plan: ???

Interesting Case: Knee, 1/6/20

RTC

CC: recurrent knee effusions

Labs: ESR 9 (nl<30), CRP 1(nl<8)



	cc	date	wbc	pmn	a-def	Cx	
	240	4/9/18	33	30	neg	NG14d	
	210	5/21/18	56	39	neg	NG14d	
	160	7/10/18	196	38	nd	NG14d	
stopped Bactrim		10/5/18					
	200	8/27/18	discarded				
	150	1/15/19	discarded				
open synovectomy		5/22/19					
	n/a	5/22/19	23	72	nd	NG14dx5	
	105	7/9/19	discarded				
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	420	11/19/19	189	30	neg	NG14d	
IR embolization		12/16/19					
	450	12/16/19	discarded				
Plan:	305	12/21/19	discarded				55 prepatellar, 250 intra-articular

Dx: defect in retinaculum allowing communication between the joint and prepatellar bursa

-> Arthrotomy, synovectomy, capsular closure

Interesting Case: Knee, 2/13/20

OR

Aspiration: wbc 175

Redundant skin anteriorly

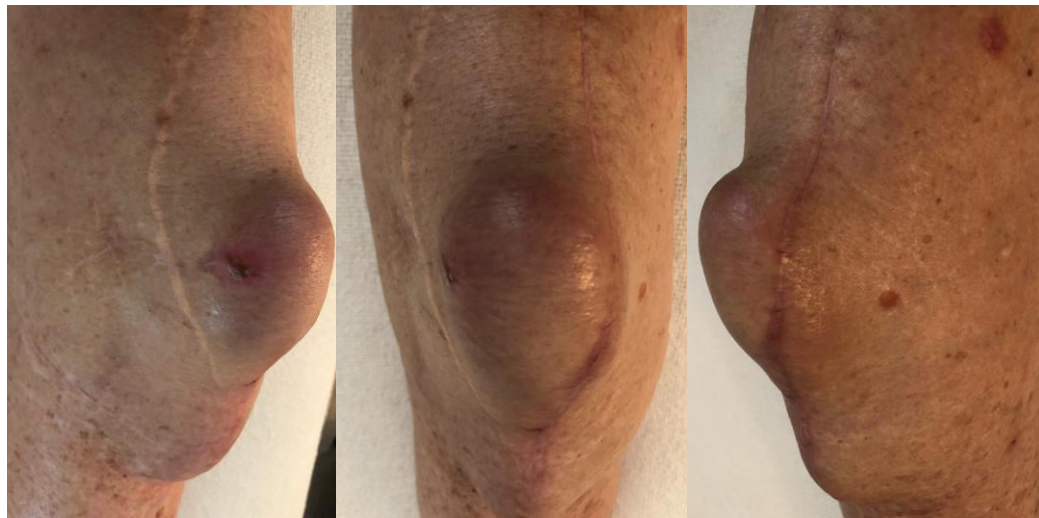
essentially a tissue expander

impending sinus

2mm rent is retinaculum identified

joint space communicating with

prepatellar bursa



Up-sized poly 12→14.

Excised redundant retinaculum, Advanced patellar ligament in pants-over-vest fashion.

Excised redundant skin, closed primarily.

Plans: WBAT, HKB LIE x 2weeks

Interesting Case: Knee

2/28/20, 2 weeks post-op

Discontinue KI



Interesting Case: Knee, 3/9/20

4 weeks post-op

Fell on her Right knee while moving boxes out of son's apartment **at 3 weeks post-op.**

Now with swelling and **fluid collection** between skin and capsule.

Concern that she may have damaged the capsular repair.

5 degree extensor lag

3 months post-op (5/12/20)

2+ effusion

5 degree extensor lag

5 months post-op (7/14/20)

3+ effusion, 200cc aspirated

25 degree extensor lag

After the aspiration

Dx: ???

Plan: ???



Interesting Case: Knee, 3/9/20

4 weeks post-op

Fell on her Right knee while moving boxes out of son's apartment **at 3 weeks post-op.**

Now with swelling and **fluid collection** between skin and capsule.

Concern that she may have damaged the capsular repair.

5 degree extensor lag

3 months post-op (5/12/20)

2+ effusion

5 degree extensor lag

5 months post-op (7/14/20)

3+ effusion, 200cc aspirated

25 degree extensor lag

After the aspiration



Plan: Dx: Incompetent retinaculum -> extensor mechanism reconstruction with Marlex Mesh

Interesting Case: Knee, 8/13/20

OR

Extensor mechanism reconstruction

Scar revision

Marlex mesh

Patellar tendon intact, but attenuated.

Transected, overlapped, repaired.

Plan: HKB LIE x 3 months

Pre-Op



Post-OP



Interesting Case: Knee, 8/13/20

OR

Extensor mechanism reconstruction

Scar revision

Marlex mesh available but not used

Patellar tendon intact, but attenuated.

Transected, overlapped, repaired.

Plan: HKB LIE x 3 months

8/27/20 Present to ED w pain and swelling

ESR 42 (30), CRP 5.5 (0.5)

Pre-Op



Post-OP



Interesting Case: Knee, 8/13/20

OR

Extensor mechanism reconstruction

Scar revision

Marlex mesh available but not used

Patellar tendon intact, but attenuated.

Transected, overlapped, repaired.

Plan: HKB LIE x 3 months

8/27/20 Present to ED w pain and swelling

ESR 42 (30), CRP 5.5 (0.5)

Aspiration: wbc 2,556, 96% pmn

Pre-Op



Post-OP



Interesting Case: Knee, 8/13/20

OR

Extensor mechanism reconstruction

Scar revision

Marlex mesh available but not used

Patellar tendon intact, but attenuated.

Transected, overlapped, repaired.

Plan: HKB LIE x 3 months

8/27/20 Present to ED w pain and swelling

ESR 42 (30), CRP 5.5 (0.5)

Aspiration: wbc 2,556, 96% pmn

Alpha-defensin: negative

Pre-Op



Post-OP



Interesting Case: Knee, 8/13/20

OR

Extensor mechanism reconstruction

Scar revision

Marlex mesh available but not used

Patellar tendon intact, but attenuated.

Transected, overlapped, repaired.

Plan: HKB LIE x 3 months

8/27/20 Present to ED w pain and swelling

ESR 42 (30), CRP 5.5 (0.5)

Aspiration: wbc 2,556, 96% pmn

Alpha-defensin: negative

CX: Coag Negative Staph

Pre-Op



Post-OP



Interesting Case: Knee, 8/13/20

OR

Extensor mechanism reconstruction

Scar revision

Marlex mesh available but not used

Patellar tendon intact, but attenuated.

Transected, overlapped, repaired.

Plan: HKB LIE x 3 months

8/27/20 Present to ED w pain and swelling

ESR 42 (30), CRP 5.5 (0.5)

Aspiration: wbc 2,556, 96% pmn

Alpha-defensin: negative

CX: Coag Negative Staph

Plan: ???

Pre-Op



Post-OP



Interesting Case: Knee, 9/3/20





Interesting Case: Knee, 9/11/20

Interesting Case: Knee, 9/14/20



PLAN: ???

Interesting Case: Knee, 9/14/20



PLAN: Plastic Surgery consultation: “copious fluid, most likely colonized, possible PJI...”

Interesting Case: Knee, 9/14/20



PLAN: Plastic Surgery consultation: “copious fluid, most likely colonized, possible PJI...” PLAN?

Interesting Case: Knee, 9/22/20

Clear full-thickness injury
ESR 105 (30), CRP 2.1 (0.8)

PLAN: ???



Interesting Case: Knee, 9/22/20

Clear full-thickness injury
ESR 105 (30), CRP 2.1 (0.8)

PLAN:

OR 9/23/20

Explant, static abx spacer

Possible gastric flap

Possible free flap



Interesting Case: Knee, 9/22/20

Clear full-thickness injury
ESR 105 (30), CRP 2.1 (0.8)

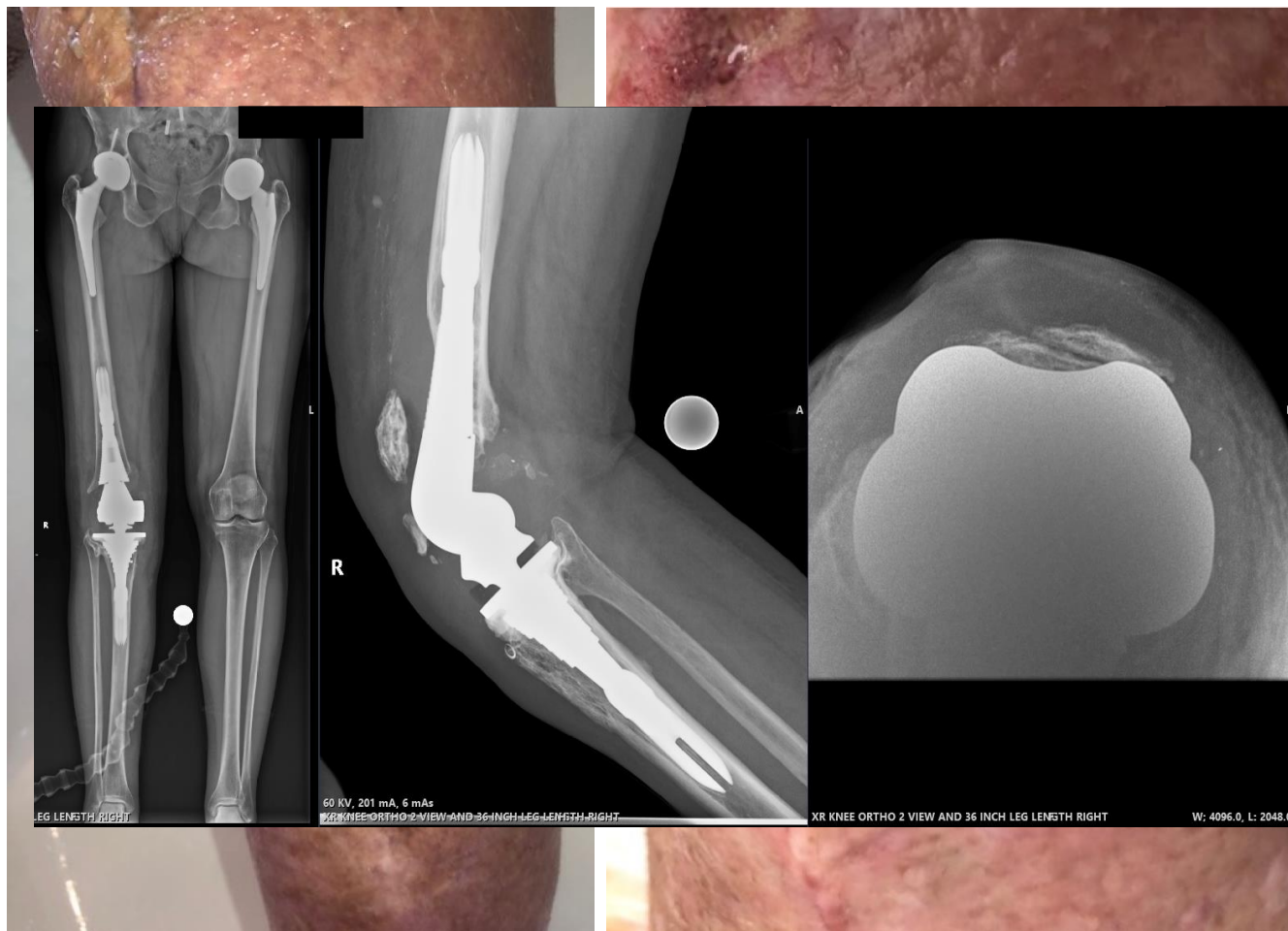
PLAN:

OR 9/23/20

Explant, static abx spacer

Possible gastric flap

Possible free flap



Interesting Case: Knee, 9/23/20

Synthes humeral nail, abx Simplex cement

5x deep tissue cultures

Removed all non-absorbable sutures

Thorough synovectomy

High-speed burr and osteotomes, minimal bone loss

Canals reamed and curetted

care to avoid THA implant proximally

Intentionally shortened limb to aid in closure

Distalized patella while closing capsule

Rotational flap on skin, no need for gastroc flap

Incisional wound vac, HKB LIE, strict elevation

ID consult, PICC line

If wound fails to heal then

Plan for gastroc flap in 5-7 days



Interesting Case: Knee, 9/30/20

1 week post-op
TTWB, HKB LIE, iVAC
Strict elevation
Cx: CoNS x5



Interesting Case: Knee, 10/5/20

2 weeks post-op

Replace iVac

TTWB, HKB LIE, strict elevation

Shared photo and plan with plastic surgery colleagues

ID co-management: pansensitive CoNS.

Cefazolin via PICC, end date 11/3/20

Weekly clinic visits for wound checks...

3 weeks (10/12/20): iVac change

4 weeks (10/19/20): drainage decreasing, iVac change



Interesting Case: Knee

5 weeks (10/26/20)

iVac change

ESR 5 (30)

6 weeks (11/3/20)

iVac change

Extend abx to

11/30/20

7 weeks (11/9/20)

stop iVac

start wet-to-dry

11/16/20, 11/23/20,

11 weeks (12/8/20)

stop IV Abx

start PO abx



Interesting Case: Knee



Interesting Case: Knee

12/15/20



2/2/21

PLAN:
???



Interesting Case: Knee

12/15/20



2/2/21



PLAN:

Plastics consult:

Exchange and flap (2-stage)

Replant and flap (1-stage)

or local wound care?

Interesting Case: Knee

12/15/20



2/2/21



PLAN:

Plastics consult:

Exchange and flap (2-stage)

Replant and flap (1-stage)

or local wound care?

Plastics favors 2-stage:

- 1) Spacer exchange w flap
- 2) Elevate flap and replant

Interesting Case: Knee

12/15/20



2/2/21



PLAN:

Plastics consult:

- Exchange and flap (2-stage)
- Replant and flap (1-stage)
- or local wound care?

Plastics favors 2-stage:

- 1) Spacer exchange w flap
- 2) Elevate flap and replant

At pre-op visit in March
patient feels there has been
some progress

Interesting Case: Knee

12/15/20



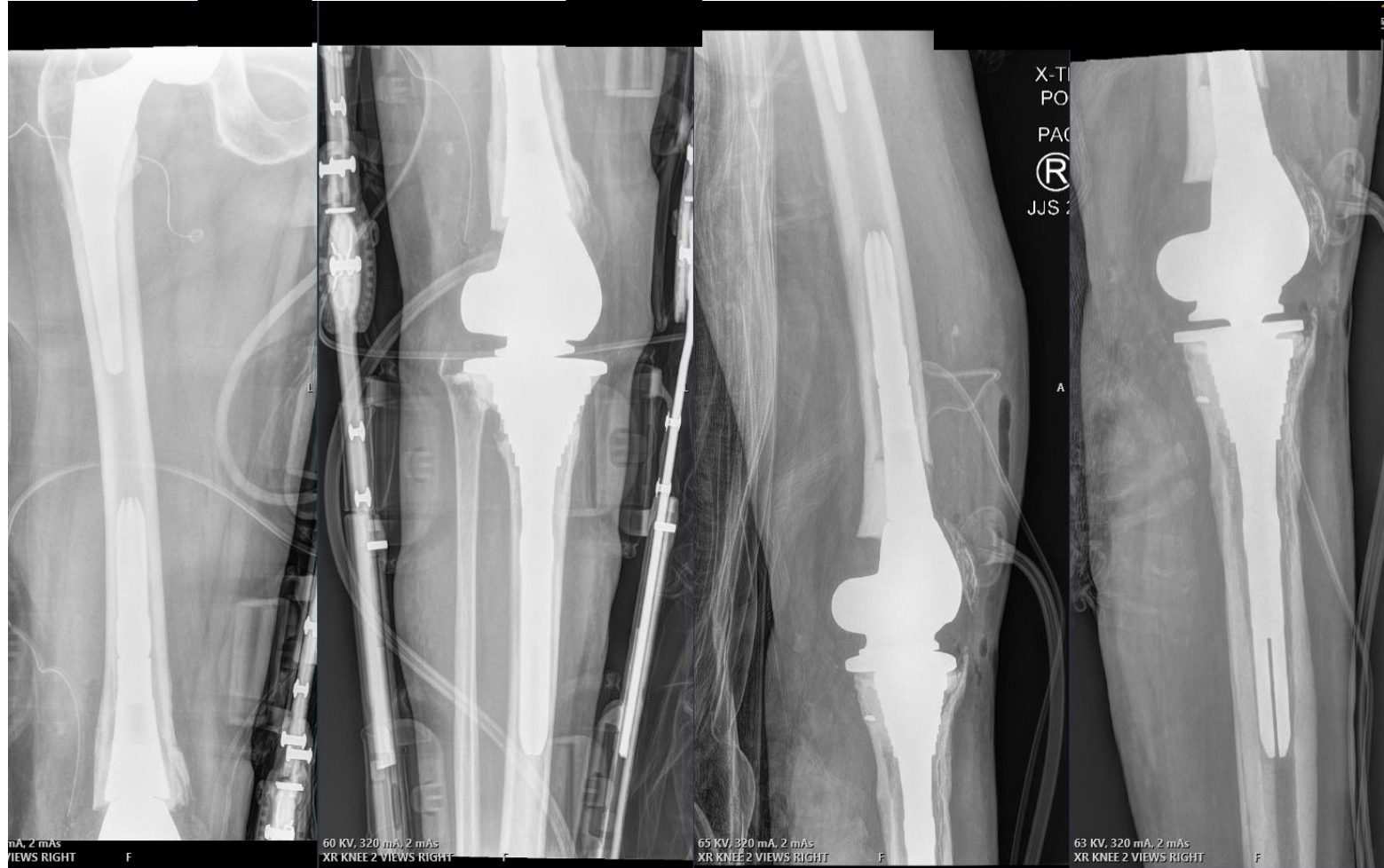
2/2/21



5/11/21



Interesting Case: Knee, return to OR 5/13/21:



Interesting Case: Knee, 5/21/21

Again, weekly wound checks
WBAT, HKB LIE

When to progress motion?



Interesting Case: Knee, 5/21/21

Again, weekly wound checks
WBAT, HKB LIE

At 6 weeks allowed 10 deg
At 8 weeks allowed 70 deg
No extensor lag noted



Interesting Case: Knee, presents to ED 7/19/21

Mechanical ground level fall

Tripped while carrying a case of water



Interesting Case: Knee, presents to ED 7/19/21

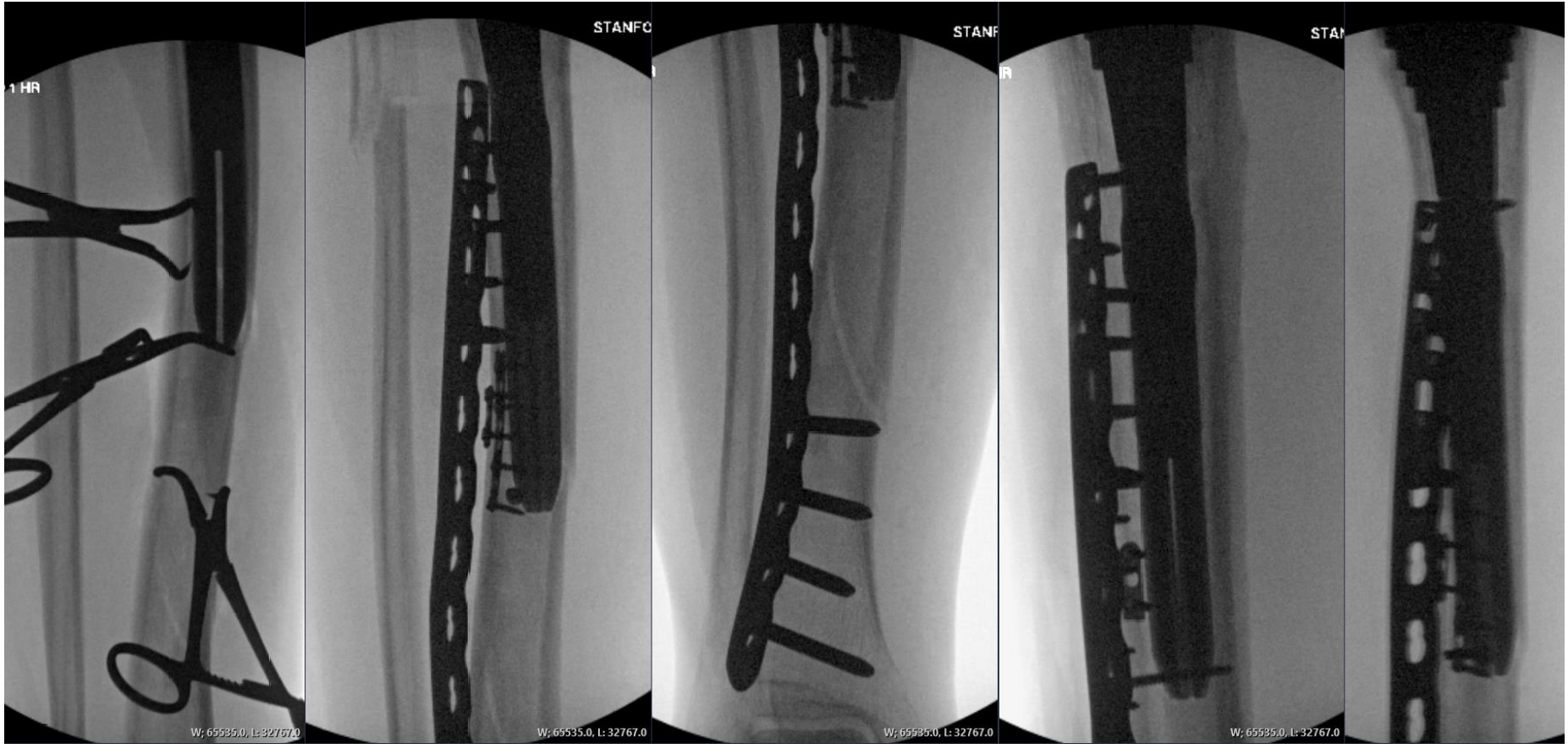
Mechanical ground level fall

Tripped while carrying a case of water

Managed by
Trauma service



Interesting Case: Knee, presents to OR 7/20/21



Interesting Case: Knee

NWB x 6weeks

TDWB x 6 weeks

WBAT at 3 months



Interesting Case: Knee

NWB x 6 weeks

TDWB x 6 weeks

WBAT at 3 months

At 8 weeks noted

90 deg extensor lag

Plan: ???



Interesting Case: Knee

NWB x 6weeks

TDWB x 6 weeks

WBAT at 3 months

At 8 weeks noted

90 deg extensor lag

At 10 weeks discussed

Drop lock brace



Interesting Case: Knee

NWB x 6weeks

TDWB x 6 weeks

WBAT at 3 months

At 8 weeks noted

90 deg extensor lag

At 10 weeks discussed

Drop lock brace

At 12 weeks planned

For recon w Marlex mesh

+/- gastric flap



Interesting Case: Knee

NWB x 6 weeks

TDWB x 6 weeks

WBAT at 3 months

At 8 weeks noted

90 deg extensor lag

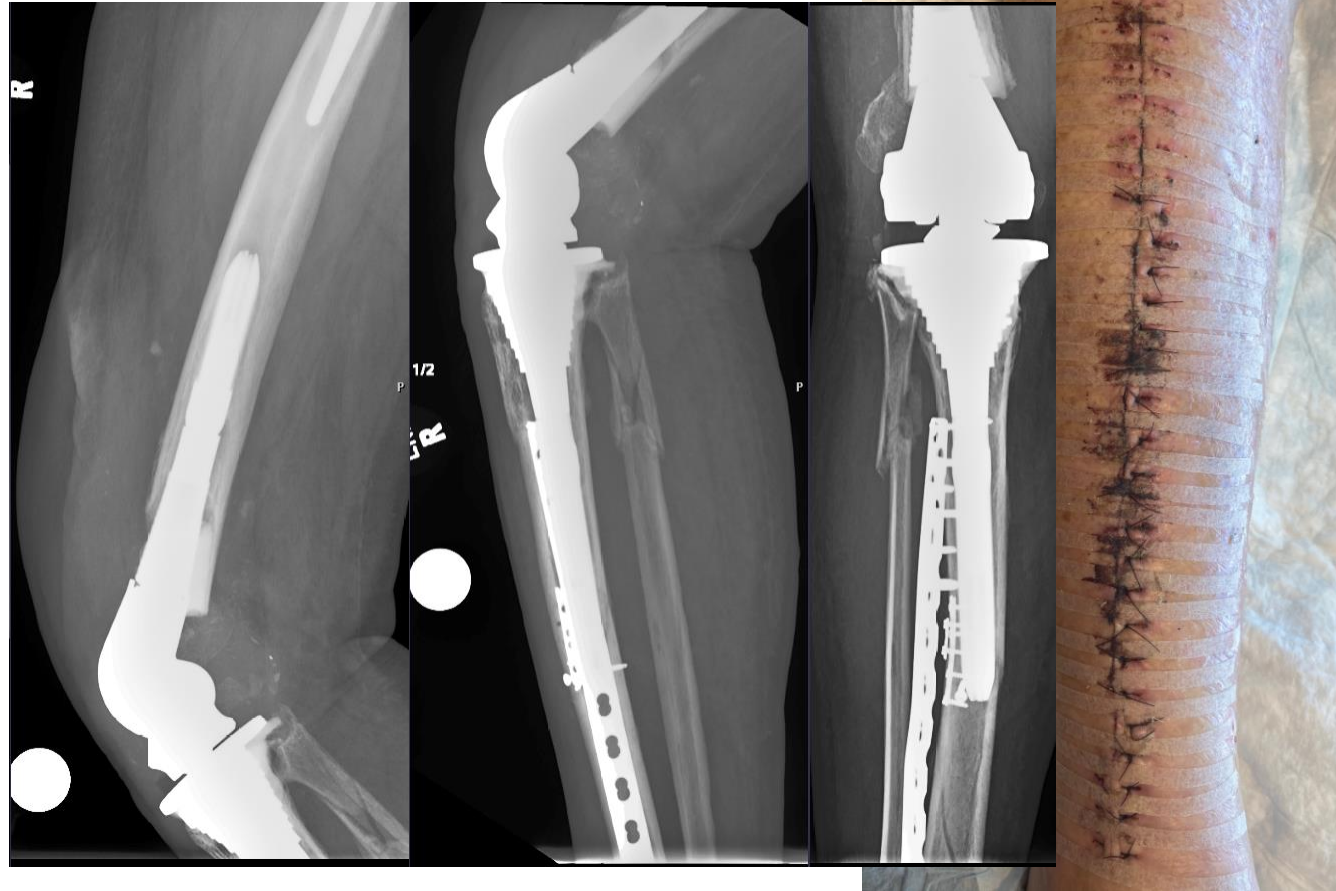
At 10 weeks discussed

Drop lock brace

At 12 weeks planned

For recon w Marlex mesh

+/- gastric flap



Interesting Case: Knee, revision extensor mechanism recon OR 12/10/21

OR

medial 2/3 of tubercle avulsed
patella subluxated laterally
liner sized up to 14
carefully identified site for
mesh insertion
3.5mm screw w washer
tubularized mesh weaved
through patella tendon
incorporated w non-absorbables
able to close skin, no flap.
decision regarding flap was
made with plastic surgeon



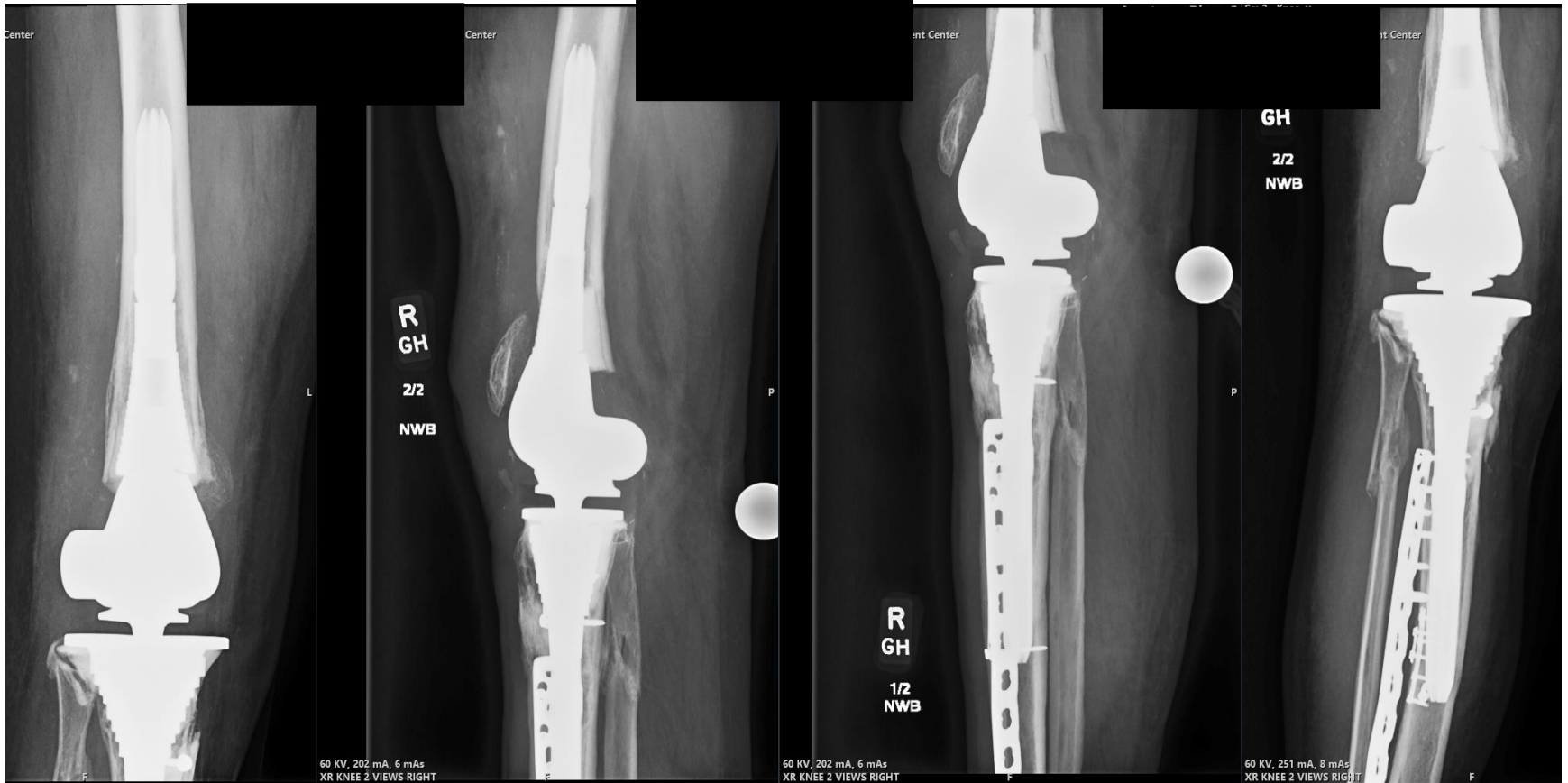
Interesting Case: Knee

s/p R revision TKA and extensor mechanism reconstruction 12/10/21



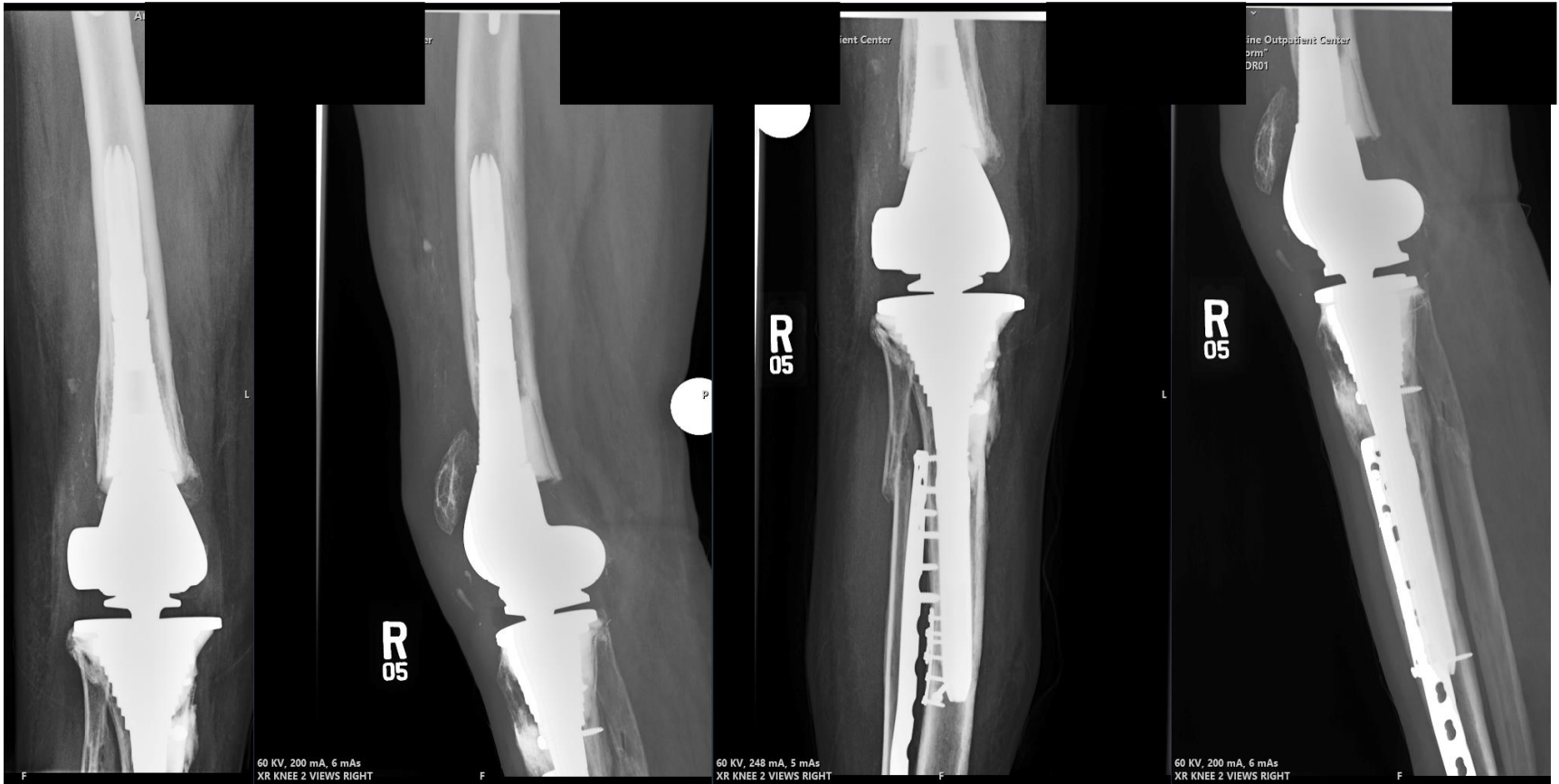
Interesting Case: Knee, 01/18/22

s/p R revision TKA and extensor mechanism reconstruction 12/10/21



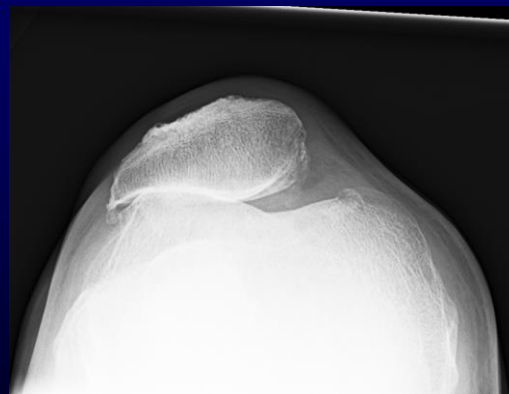
Interesting Case: Knee, 04/18/22

s/p R revision TKA and extensor mechanism reconstruction 12/10/21; 10 lag, keflex



Stiffness

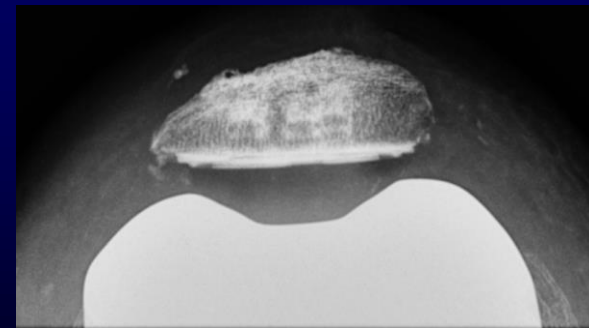
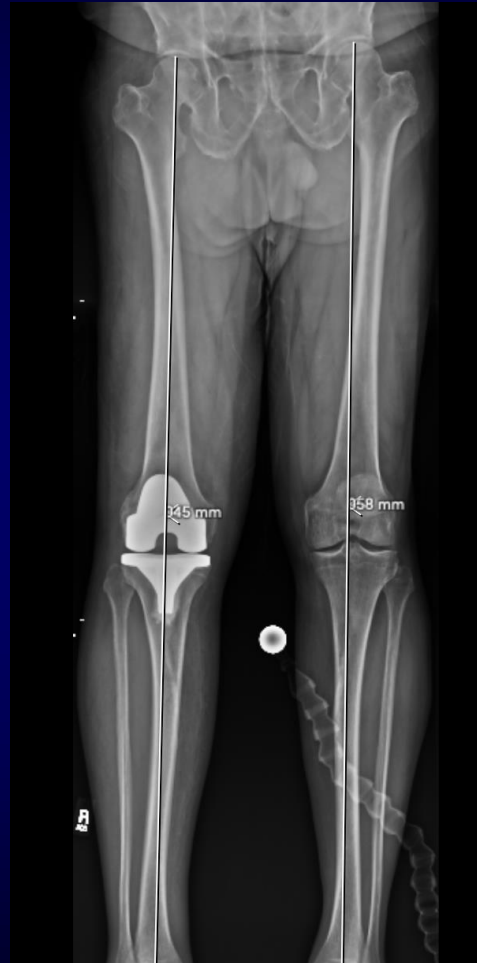
- 81 yo active male
- PAF on Eliquis
- Golf
- 0-120° preop
- ? PFJ replacement
- ? TKA



Stiffness

0-80° 6 weeks
0-85° 6 weeks

Timing of manipulation ?
Cortisone injection ?

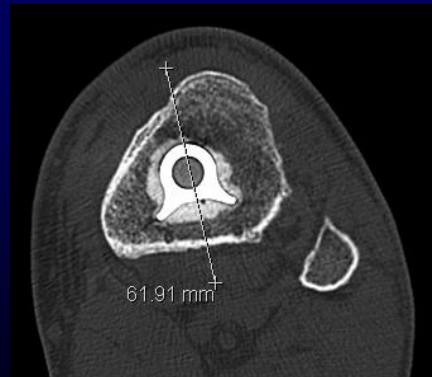
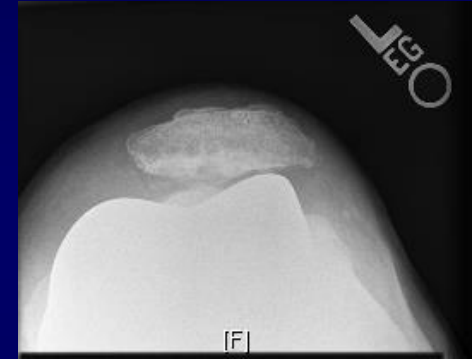


Stiffness

- 0-125 after manip
- 12 weeks: 0-105



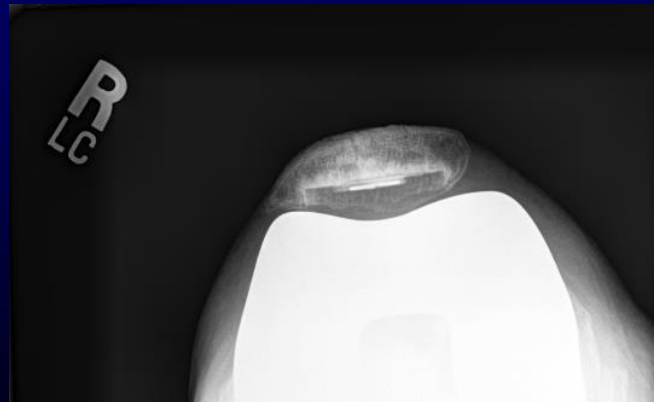
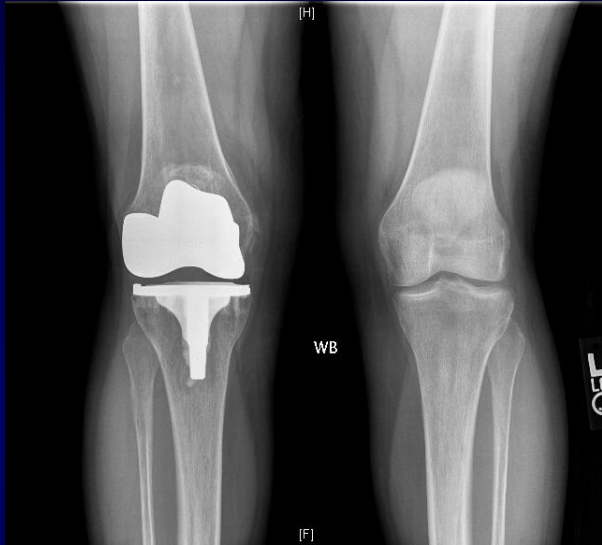
Stiffness - RM



Stiffness - RM



SS – “unstable”



+10° - 140°



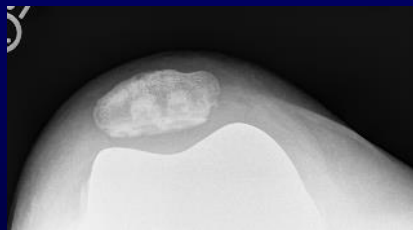
JC – “unstable”



- ? insert exchange
vs.
- ? full revision
vs.
- ? tibial revision



NM – 50 yo F, Fall, “unstable”



- ? Brace
- ? MCL reconstruction
- ? Constrained condylar
- ? Hinge



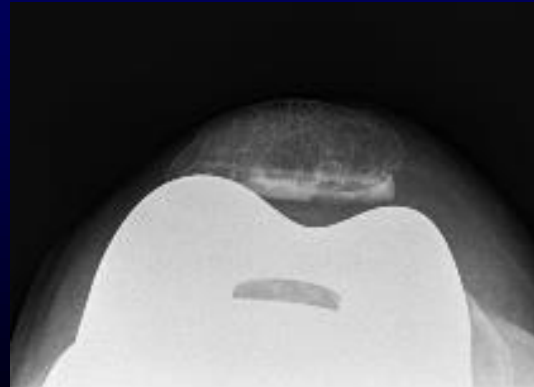
NM – MCL Insufficiency



Hamstring autograft to MCL stump



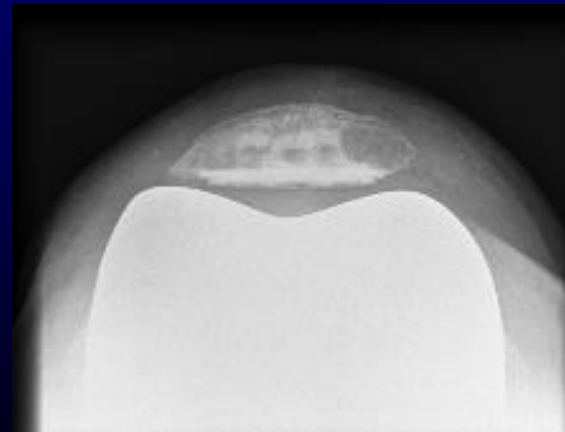
SB – Lateral Pain



SB

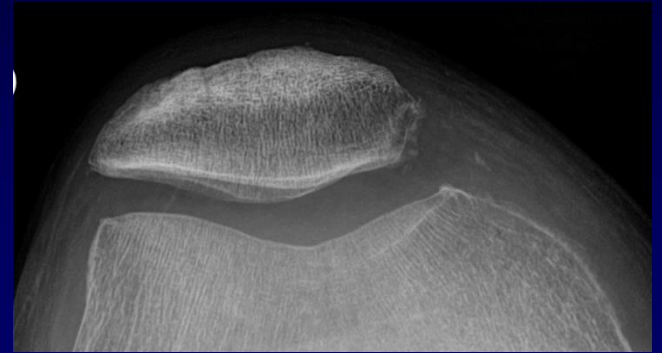
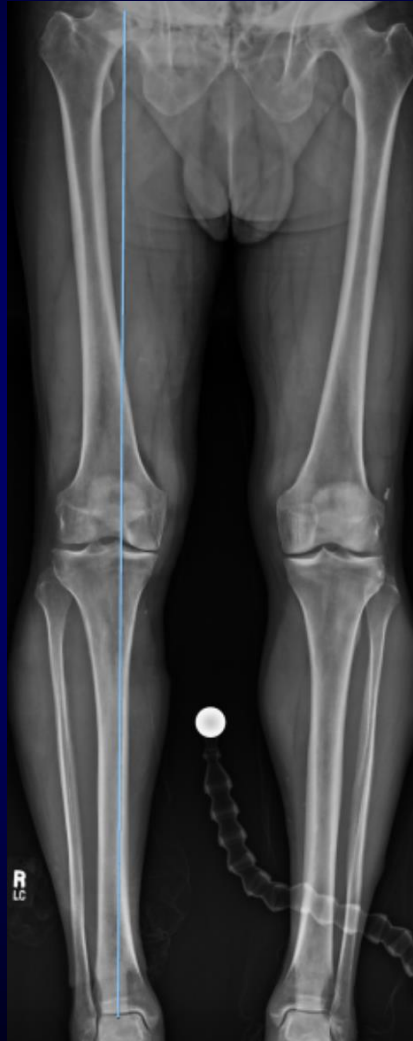


Femur IR



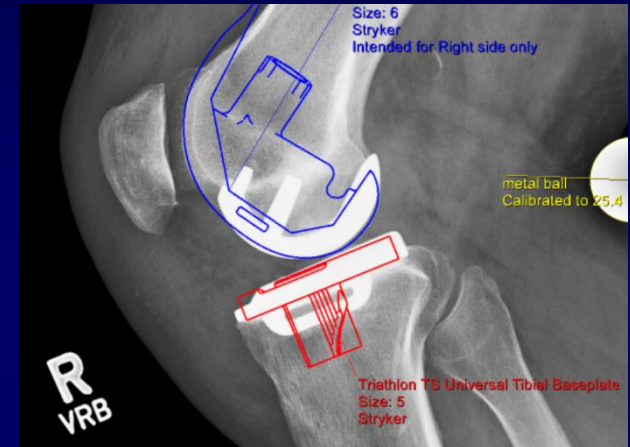
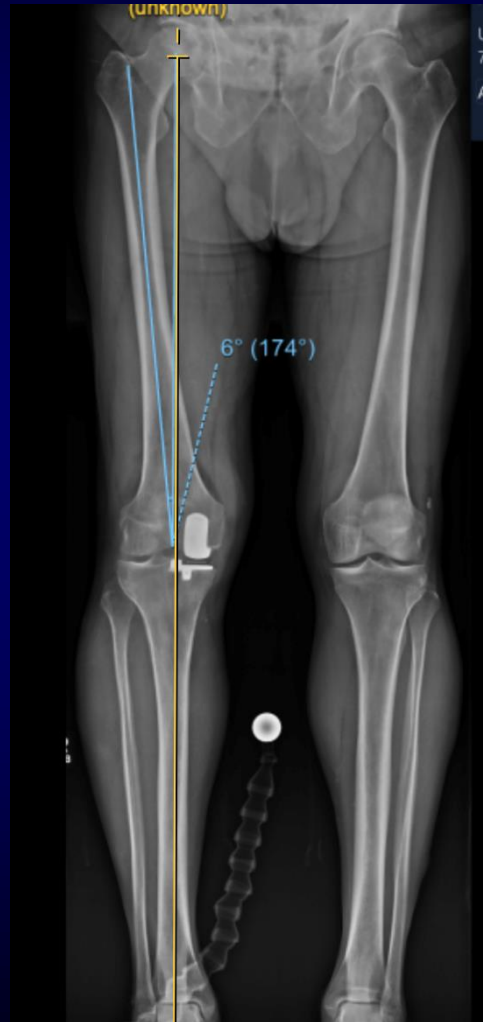
CS

- 59 yo M
- 5'9" 215 lbs.
- Medial pain



12 weeks postop

- Sharp, medial pain with WB
- No pain meds
- No assist devices

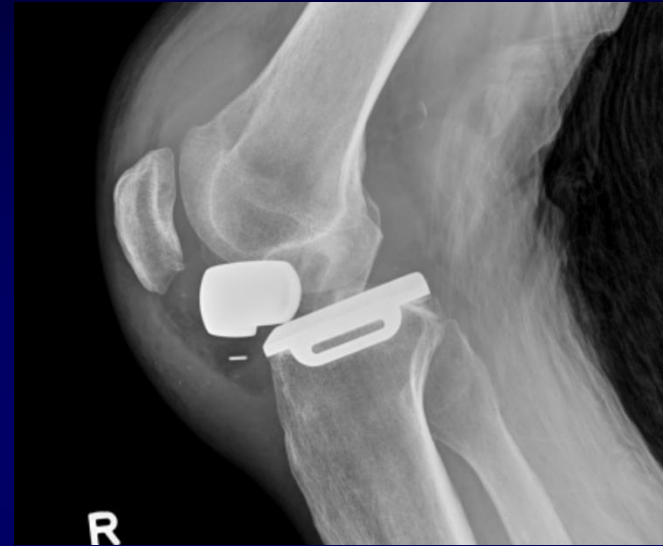
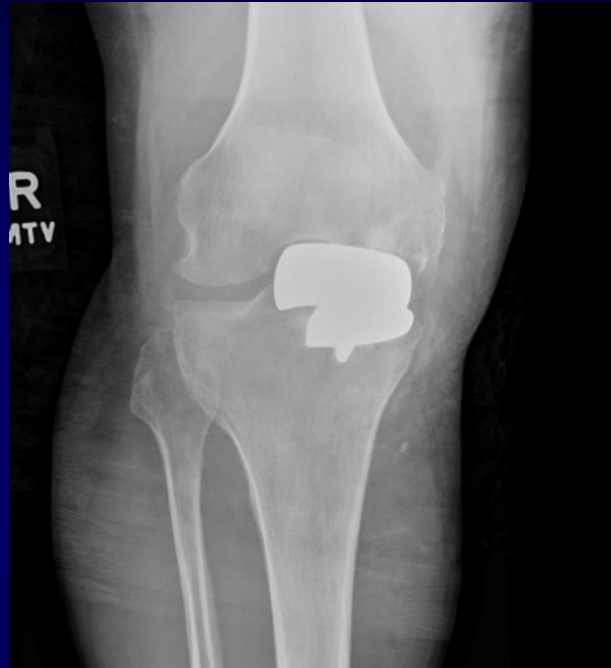


13 weeks postop

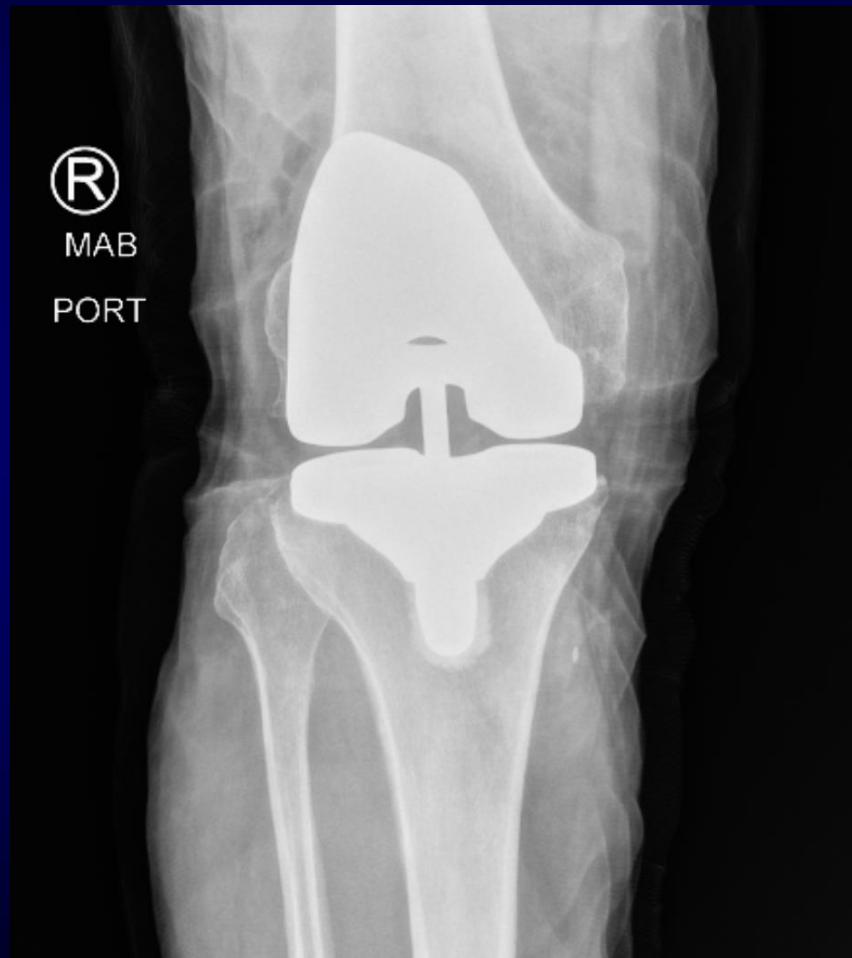
No trauma

Revision UKA ?

TKA ?



Conversion to TKA



Thank You

