Stiffness After TKA: Mechanical or Biological?

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Disclosures

- Fellowship Support
  - Arthrex
- Editorial Board
  - AJSM
  - J of Knee Surgery
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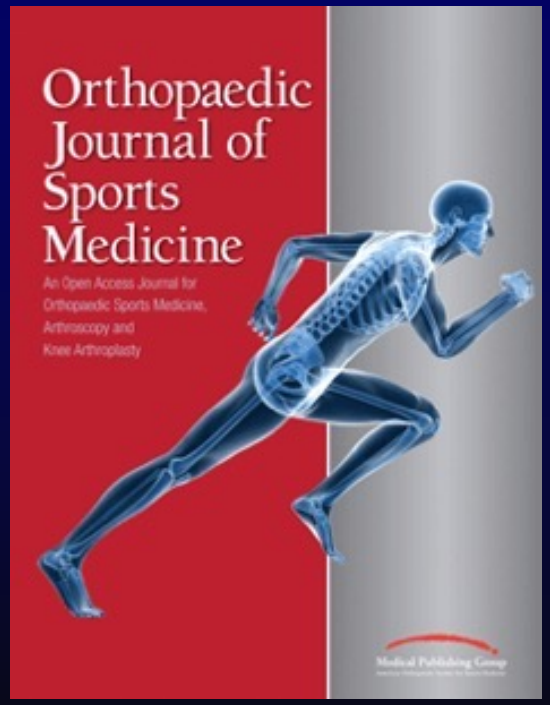

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Definition of Stiffness After TKA

Flexion < 90º

Flexion Contracture ≥ 10º

Patient Dissatisfaction

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Kalson, Bone Joint J 2016

Prevalence of Stiffness

1.3 – 5.8%

3.6% in
12,735 TKAs
At Mayo Clinic

9% of UKAs

TABLE I Prevalence of Knee Stiffness and Manipulation Under Anesthesia Rates Following Total Knee Arthroplasty

Reference	No. of Total Knee Arthroplasties	Prevalence Measure	Prevalence
Nelson (2005)[5]	1,000	Stiffness (<75° flexion)	1.3%
Yercan (2006)[6]	1,188	Stiffness (<95° flexion and/or >10° extension deficit)	5.3%
Pariente (2006)[7]	5,714	Stiffness (<90° flexion)	5.8%
Gandhi (2006)[11]	1,216	Stiffness (<90° flexion)	3.7%
Ipach (2011)[8]	858	Stiffness (<90° flexion)	4.54%
Bawa (2013)[9]	3,224	Stiffness (<90° flexion)	4.3%
Desai (2014)[13]	4,581	Manipulation under anesthesia rate	2.3%
Pfefferle (2014)[12]	229,420	Manipulation under anesthesia rate	1.51%
Werner (2015)[10]	141,016	Manipulation under anesthesia rate	4.2%

Zachwieja, JBJS Reviews 2018
Owen, J Arthroplasty 2021
Fournier SICOT 2021

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Burden of Stiffness

Accounts for 28% of Hospital Readmissions Within 90 Days

10% of Revision Within 5 Years

			<2 Years		2–5 Years	
All Patients	844	100.0%	298	35.3%	210	24.9%
Aseptic Loosening	263	31.2%	56	18.8%	82	39.0%
Instability	158	18.7%	75	25.2%	39	18.6%
Infection	137	16.2%	68	22.8%	35	16.7%
Poly Wear	84	10.0%	3	1.0%	1	0.5%
Arthrofibrosis	59	7.0%	38	12.8%	15	7.1%
Malalignment	56	6.6%	24	8.1%	16	7.6%
Isolated Patella Revision	35	4.1%	15	5.0%	9	4.3%
Periprosthetic Fracture	27	3.2%	7	2.3%	5	2.4%
Other	13	1.5%	7	2.3%	4	1.9%
Extensor Mechanism	10	1.2%	5	1.7%	4	1.9%
AVN patella	2	0.2%	0	0.0%	0	0.0%

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Schroer, J Arthroplasty 2013
Schairer, Clin Orthop 2014

Risk Factors

Pre-operative

Intra-operative

Post-operative

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Pre-operative Risk Factors

Patient Factors

Female

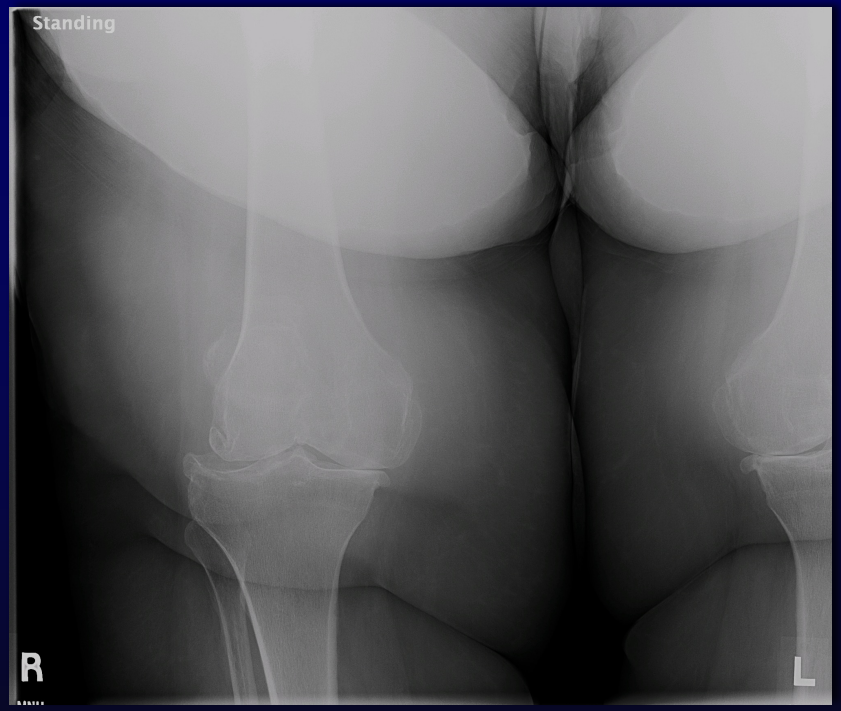
African-American

Younger Age

Nicotine Use

BMI ≥ 30

? Diabetes



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Zachwieja, JBJS Reviews 2018

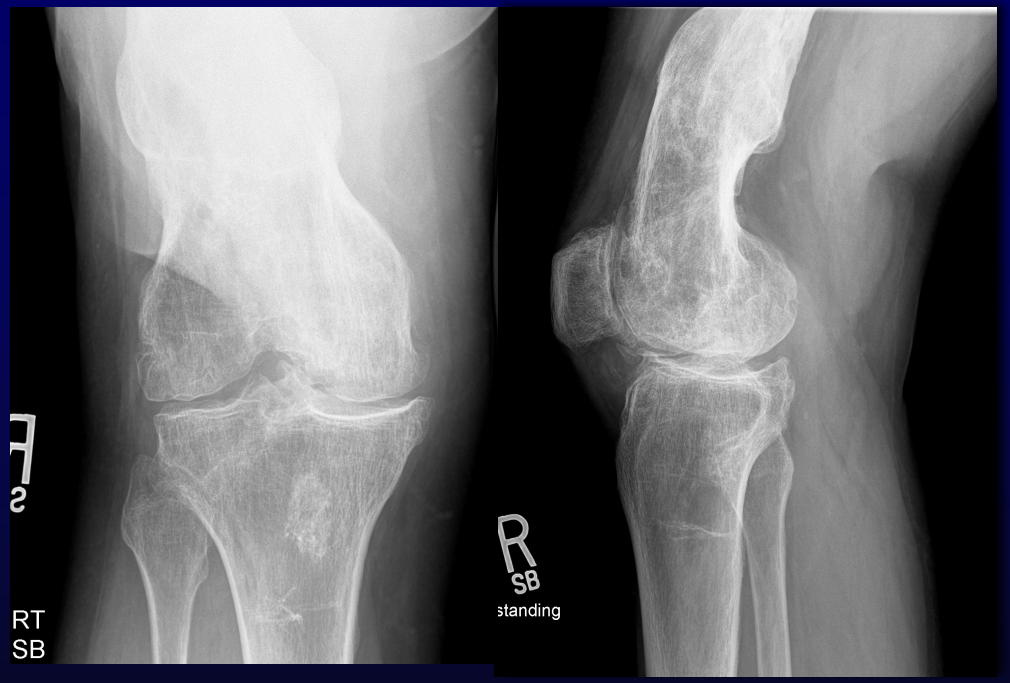
Pre-Operative Risk Factors

Knee Factors

Poor Pre-op Motion

Prior Surgery

Post-Traumatic Arthritis



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Intra-Operative Factors

Femoral Malrotation

Posterior Osteophytes

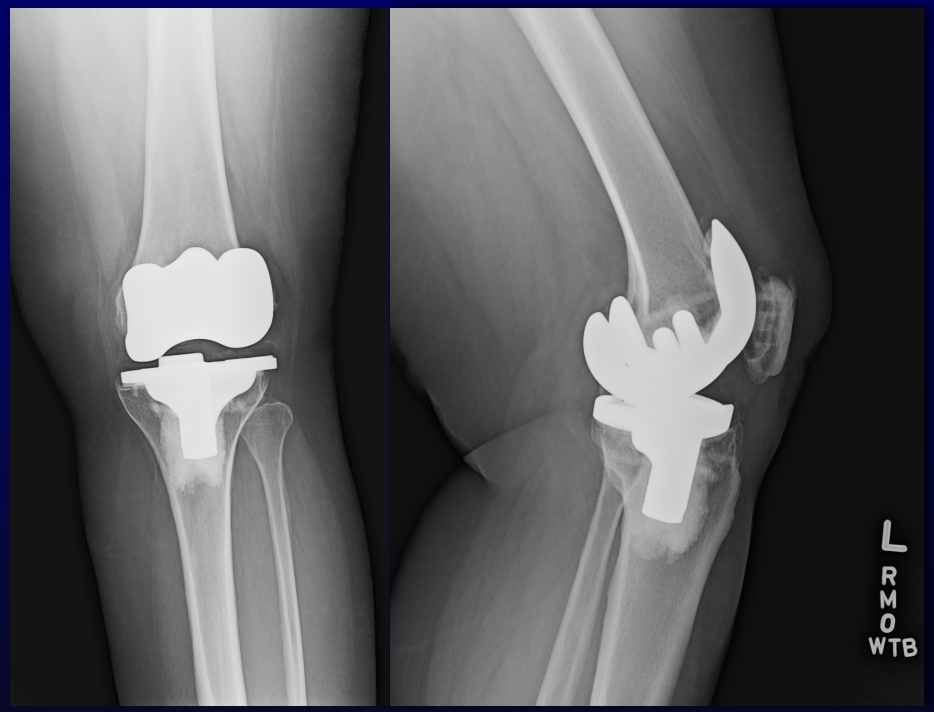
Overstuffing Patella

Elevated Joint Line

Cruciate Retaining

Tourniquet Time

Closure in Extension?



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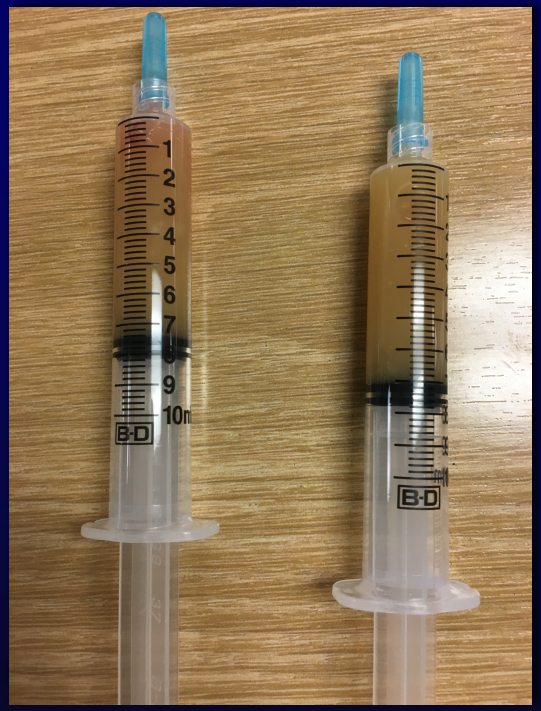
Post-Operative Factors

Infection

Pain

Hematoma

Compliance with Therapy



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Zachwieja, JBJS Reviews 2018

Clues That It is Mechanical

Review of Operative Report

Record of Intraop Motion

Physical Exam

Normal Patellar Mobility

Localized Pain

Negative Infection Work-up

ESR, CRP, Aspiration

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Radiographs

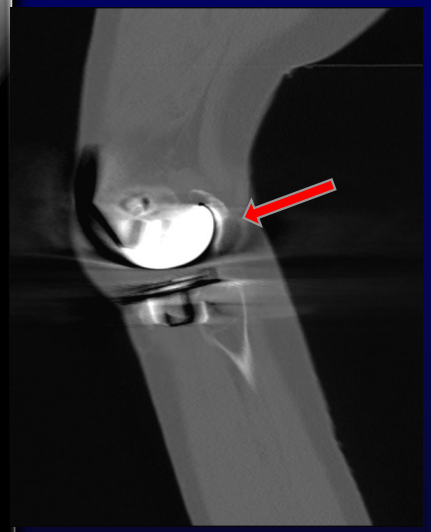
Component Sizing

Component Malpositioning

Posterior Osteophytes

Joint Line Elevation

Patella Thickness/Tracking



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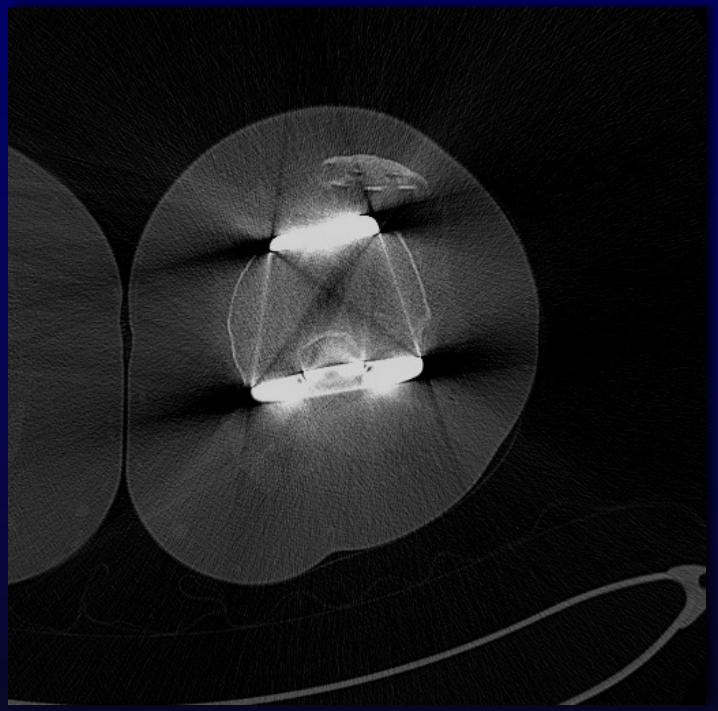
CT Scan

Assess Femoral and Tibial Component Rotation

Degree of Malrotation That is Important Is Unknown



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Manipulation Under Anesthesia

Strongly Consider
Mechanical Etiology
If Unable to Regain
Full Extension
And Nearly Full Flexion
With Early Manipulation

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Clues That It Is Biologic

Pre-op Risk Factors

Poor Pain Control

Global Pain

Diffuse Edema

Warmth

Decreased Patellar Mobility

Crepitus

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Etiology

Some Patients Have Both Biologic and Mechanical Factors Causing Stiffness

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My Approach for My Patient

Pre-op Stiffness

Pre-op Nerve Block

Spinal Anesthesia

Thorough Synovectomy

Use PS Components

Multimodal Pain Program

Trustworthy Therapist

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My Approach for My Patient

Post-operative Stiffness

If Unable to Perform Complete Rotation on Stationary Bike At 6-8 Weeks

Threaten With Manipulation

Consult Therapist

Return in 4 Weeks

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My Approach for My Patient

If No Improvement
In 4 Weeks

Perform
Closed Manipulation
Under Anesthesia
Post-op Indomethacin

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My Approach for My Patient

Persistent Stiffness

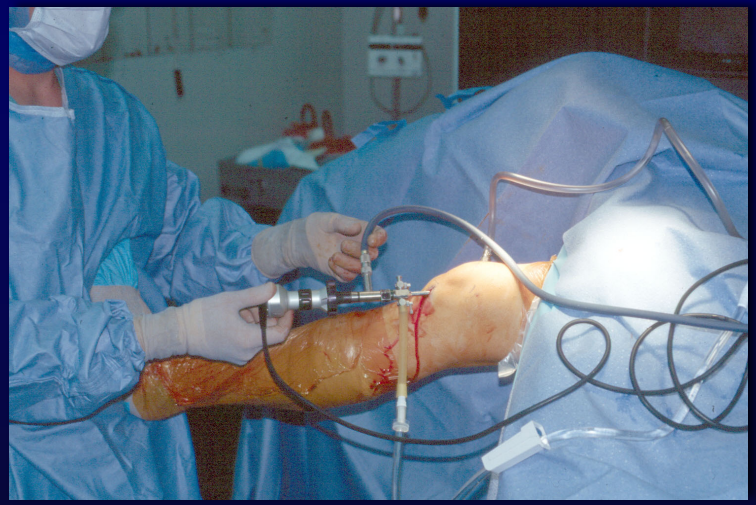
Infection Workup

Pain Control

Let the Knee Cool Down

Arthroscopic Lysis

At ≈ 1 Year



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My Approach to Referred Patient

Obtain

Pre-op Radiographs

Operative Report

Therapy Notes

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My Approach to Referred Patient

Careful Physical Exam

Radiographs

Rule Out Infection

Consider CT Scan

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My Approach to Referred Patient

If < 3 Months

Pain Control

Psychologic Encouragement

Manipulation
Under Anesthesia

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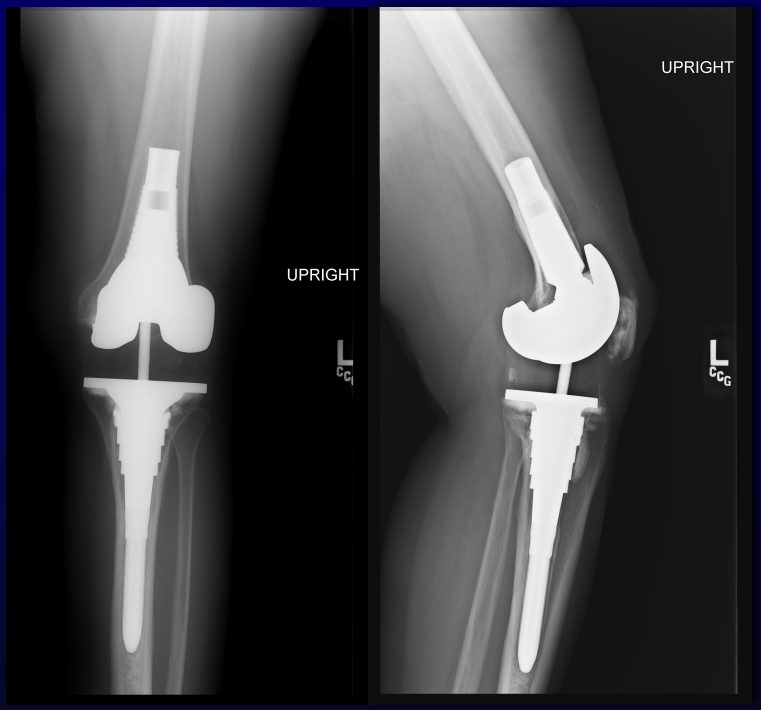
My Approach to Referred Patient

If > 3 Months

If Mechanical

Perform Revision TKA

Consider Epidural Post-op



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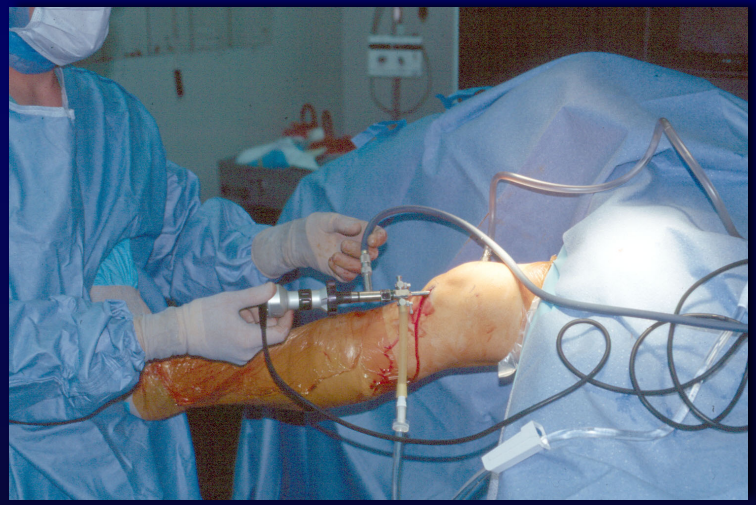
My Approach to Referred Patient

If > 3 Months

If Biological
Perform Arthroscopic
Lysis When Knee
"Cooled Down"



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Take-Home Points

- Identify At Risk Patients Pre-op
- Pain ⇔ Stiffness
- Look for Mechanical Causes
- If Mechanical – Revise
- If Biologic – MUA at 3 Months
- If Persistent – Arthroscopic Lysis at 1 Year

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Merci Beaucoup!

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