Nonoperative Treatment of Knee OA

Knee Update 2016
Gelsenkirchen, Germany

June 3, 2016

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SHELBOURNE KNEE CENTER

My Experience

- Began practice in 1982
- Decided then to devote my practice to knee surgery and rehabilitation
- Data collection to track outcomes

My Experience

- I perform about
  - 150-200 ACL reconstructions a year
  - 300 knee arthroscopies
  - 30-40 patella realignment procedures
- See many patients with knee pain/conditions that can be treated with proper rehabilitation and no surgery
  - 40-50 new patients a week

Introduction

- Patients seek treatment usually when they have an injury or condition causing asymmetry between knees
- Orthopaedic surgeons tend to think – What surgery can be done to solve the problem?
- Many knee injuries and conditions can be treated with proper rehabilitation and no surgery

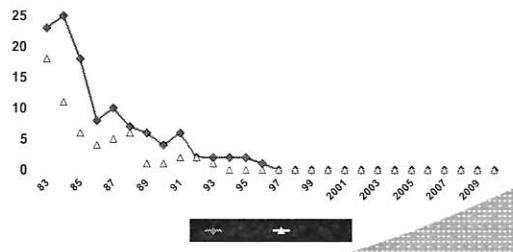
Long-term follow-up required

- Rehab before and after surgery to achieve knee symmetry is the "key" to a long-term successful result
- Many surgeons do not track long-term results
- Our short-term data showed us how important ROM was for the success of our ACL patients
- As we are getting more long-term data, we are seeing how important ROM is for long-term success as well

Goals of Surgery

- We learned many years ago that obtaining full ROM before ACL reconstruction reduced and finally eliminated the incidence of knee stiffness and arthrofibrosis after surgery

Patients with scar resections < 1%



Full Range of Motion

- Definition – Range of motion equal to the opposite normal knee

Full hyperextension

Sitting on heels

Stiff Knees are Painful Knees

- Current OA treatment based on findings with ACL research
- Our long-term ACL data also shows how important full ROM is for having a good long-term outcome
- Worse when meniscus tears or chondral defects are present

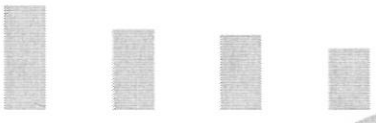
Regression analysis:

Factors related to lower subjective scores

- Subjective results: 1113 patients, mean of 15.1 years after surgery
- Lack of normal knee extension ($P<0.001$) most important factor related to lower subjective scores in the long-term after surgery

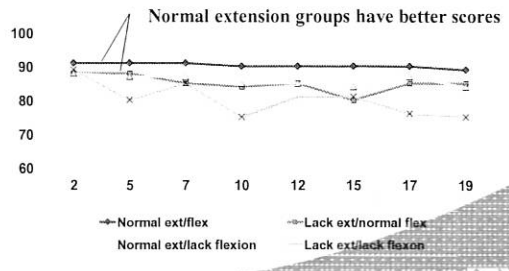
Subjective Scores Based on ROM - IKDC criteria

Significant decrease in scores when ROM deficits are present

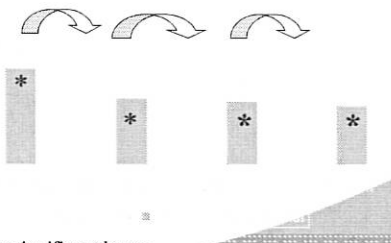


10-20 Year Follow-up:

Mean subjective scores through time

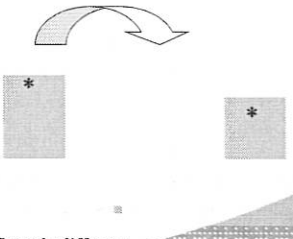


Subjective Scores (mean 15 yr. post-op): ROM and Meniscal Status



*Statistically significant lower

Subjective Scores (mean 15 yr. post-op): ROM and Chondral Status



*Statistically significantly different

Stiff Knees are Painful Knees

This patient only complained of pain in the R knee.
R knee ROM: 0-2-128 vs. L knee ROM: 3-0-140

Stiff Knees are Painful Knees

- When we see patients with a stiff, painful knee, we can't change the status of their meniscus, articular cartilage, or osteoarthritis
- BUT, we CAN change their ROM

Stiff Knees are Painful Knees

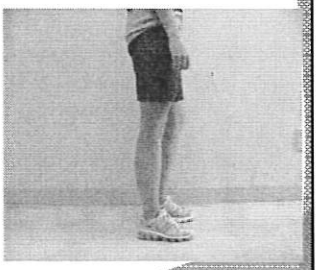
- Even in a very stiff knee, ROM can improve despite the presence of OA
- As ROM improves, symptoms decrease and function improves
- Don't underestimate these patients
- Focus the rehab on what is most important

Nonoperative Treatment

- Extension loss is the critical impairment you want to address first
- Almost all patients we see with painful, arthritic knees have developed a loss of knee extension
- Happens gradually – patients may not be aware of extension loss
- Or, they may be aware of it, but thought it was irreversible and just a consequence of OA

Bent Knees are Weak Knees

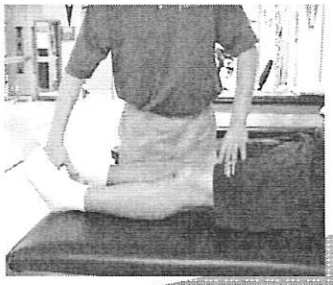
- Very difficult to stand with weight shifted onto a leg that is bent
- Patients develop a habit of favoring the injured leg



Bent Knees are Weak Knees

- Even 2-3° loss of extension compared to the opposite knee can cause this
- Extension loss gets overlooked
- Patients are sent to therapy for strengthening
- But, until they can use their leg normally, the strength deficit will persist

Assessing ROM
Passive Extension



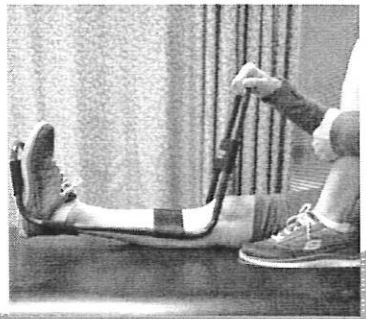
Nonoperative Treatment

- Need to obtain full ROM before aggressive strengthening can begin
- Very difficult to properly strengthen the leg when the knee doesn't fully extend
- Strengthening exercises make up only a small part of the patient's day
- Patient needs to be able to use the leg normally with everyday activities for strengthening to be effective

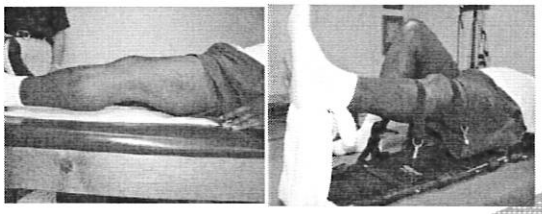
Nonoperative Treatment

- If knee doesn't straighten, patient won't stand on that leg or use it normally like the opposite leg
- Rehab process
  - Obtain full ROM before adding aggressive strengthening exercises
  - Maintain full ROM throughout the strengthening and functional activity exercises
  - Teach patient to recognize subtle deficits in ROM

Extension Stretch Device

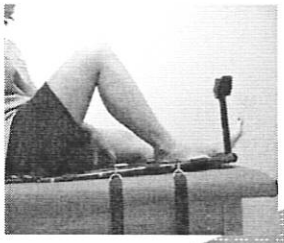


Knee Extension Loss

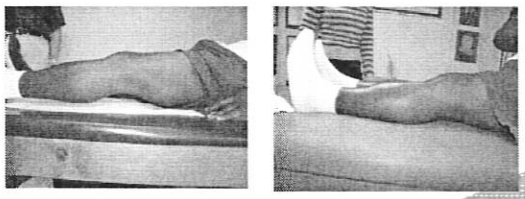


Passive Knee Extension Device

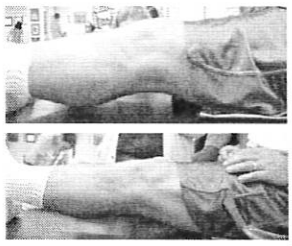
- Traditional knee extension exercises were not rapidly effective, so a knee extension device was utilized in PT
- Many patients chose to use the device at home



At initial exam;
Before and after 1 tx with passive knee extension device



1 wk after initial exam;
Before and after tx with passive knee extension device



Nonoperative Treatment

- It is very important to work on extension without also working on flexion or strengthening at the same time
- Common for patients to feel slightly more stiff in flexion after working on their extension
  - Especially right after a treatment
  - Reassure them that this is normal and temporary

Nonoperative Treatment

- Often, patients will see improvements in flexion as their extension gets better
- Once extension ROM has been maximized (or has reached a plateau), begin working on flexion
- Monitor extension ROM to make sure it doesn't get tight again
- If patient starts to lose extension, back off from flexion exercises

Nonoperative Treatment

- Chronic stiffness can take longer to improve
- A knee extension device is often very helpful for this patient population
  - Patient-controlled
  - Longer duration stretching
  - Continuous pressure
  - Patient is able to relax better than with some other stretching methods

Nonoperative Treatment

- I know many people feel that as long as their ROM is "functional", it's not worth working on it any more
  - >110 deg of flexion to climb stairs
- We are finding that even patients with ROM that is within functional limits have pain because of the stiffness
- Don't be afraid to set the bar high
- We've not had any TKA patients tell us they have too much knee flexion

Nonoperative Treatment

- While working on extension and flexion motion, there are several other treatments that won't inhibit ROM progress
  - Ice, compression, and elevation for swelling control
    - Incorporate this into their daily routine if needed
    - Or use as needed to control pain

Nonoperative Treatment: Injections

- If needed, we use cortisone injections as an adjunct to rehabilitation
- Goal is to decrease their pain to allow them to work on rehab more effectively
- If they are able to improve their motion and decrease their swelling, they will continue to have relief after the injection wears off
- Otherwise, the injection is just a temporary fix

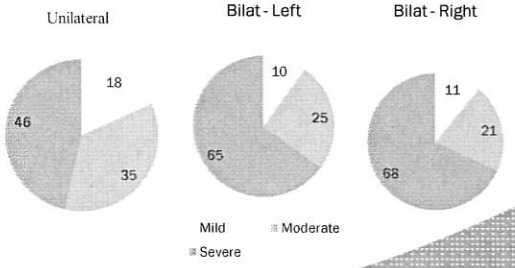
OA Rehab Study

- 353 enrolled between Jan 2013 and February 2016
  - 173 women; 180 men
  - Average age – 62 years
  - 251 Unilateral / 102 Bilateral
  - 63 have gone on to have TKA surgery (18%)
  - 290 remaining patients
  - 82 dropped (23%)
    - 13 – knee better; did not want to pay for return visits
    - 7 – knee not better; did not want to pay for return visits
    - 10 - other health conditions
    - 2 – moved out of state
    - 2 - died
    - 48 – unknown reason

OA Rehab Study

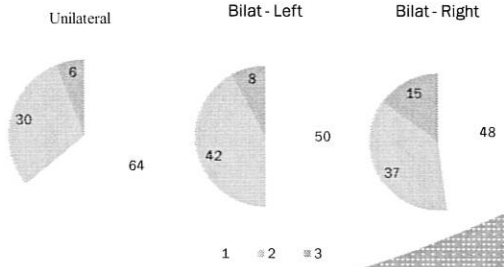
- Unilateral ROM data compared to NI knee
  - Difference between knees
  - Improvement of involved knee compared to initial eval values
- Bilateral ROM data reported as
  - Right and Left
  - Change in right and left compared to initial eval
- ROM and KOOS data at initial eval, 1 mon, 2-3 mon, 6 mon, 1 year

Highest Radiographic Grade (%)



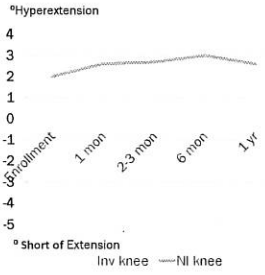
Bilateral group had more severe OA grade

Number of Compartments Involved (%)



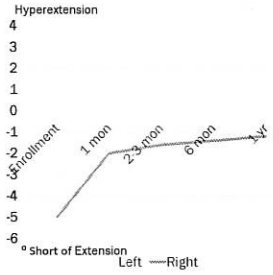
Most of bilateral group had at least 2 involved compartments

Unilateral Extension (Mean)



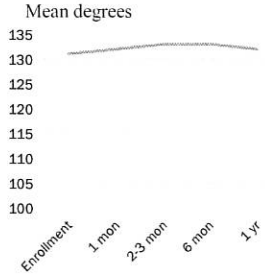
- Improvement seen
  - 88% at 1 mon
  - 93% at 3 mon
  - 87% at 6 mon
  - 87% at 1 year

Bilateral Extension (Mean)



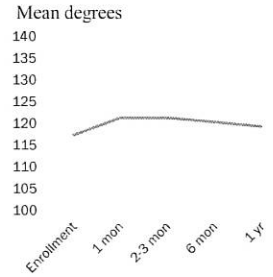
- Improvement seen
  - 82% at 1 mon
  - 80% at 3 mon
  - 85% at 6 mon
  - 90% at 1 year

Unilateral Flexion

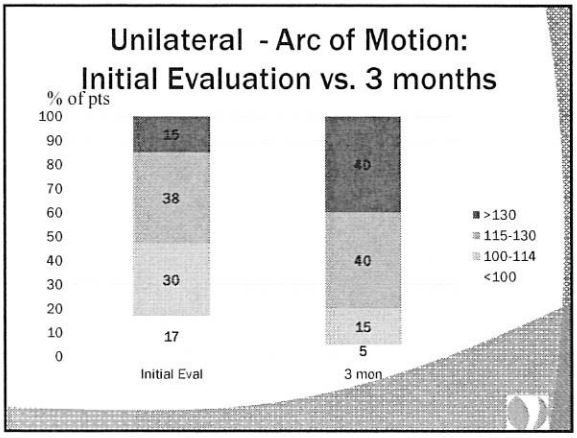


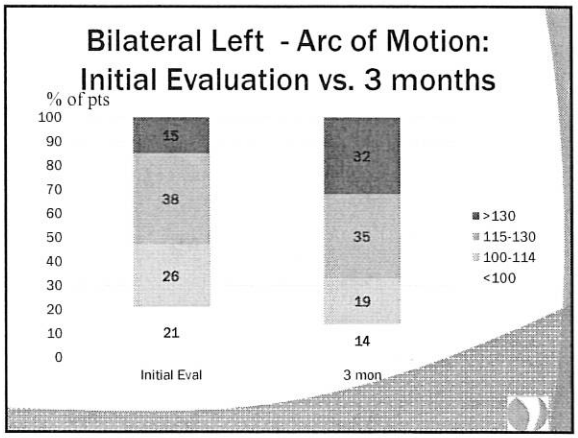
- Improvement seen
  - 76% at 1 mon
  - 76% at 3 mon
  - 73% at 6 mon
  - 67% at 1 year

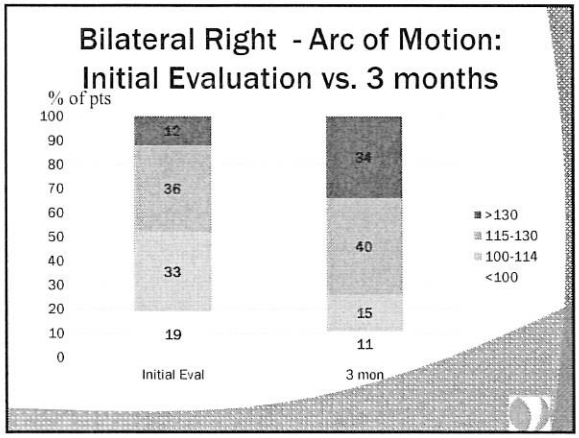
Bilateral Flexion

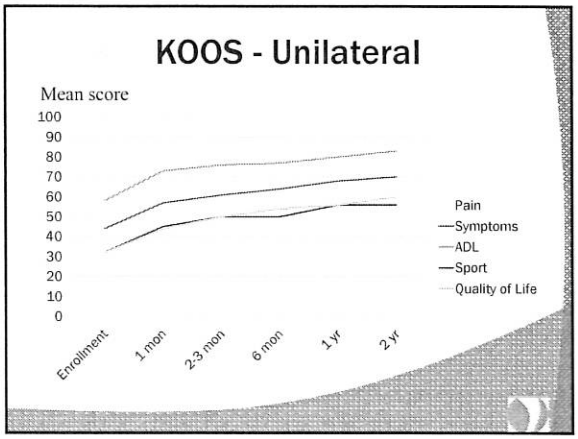


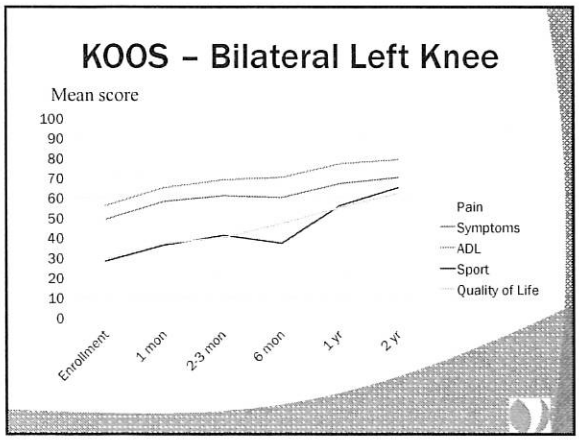
- Improvement seen
  - 69% at 1 mon
  - 65% at 3 mon
  - 72% at 6 mon
  - 70% at 1 year

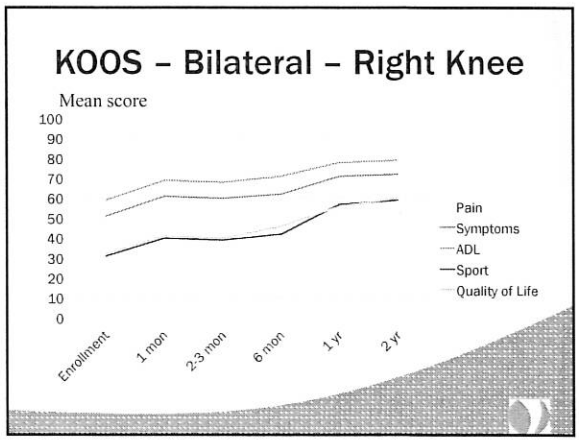

Unilateral - Arc of Motion:
Initial Evaluation vs. 3 months
% of pts
100
90
80
70
60
50
40
30
20
10
0
15
38
30
17
Initial Eval
40
40
15
5
3 mon
>130
115-130
100-114
<100


Bilateral Left - Arc of Motion:
Initial Evaluation vs. 3 months
% of pts
100
90
80
70
60
50
40
30
20
10
0
15
38
26
21
Initial Eval
32
35
19
14
3 mon
>130
115-130
100-114
<100


Bilateral Right - Arc of Motion:
Initial Evaluation vs. 3 months
% of pts
100
90
80
70
60
50
40
30
20
10
0
12
36
33
19
Initial Eval
34
40
15
11
3 mon
>130
115-130
100-114
<100

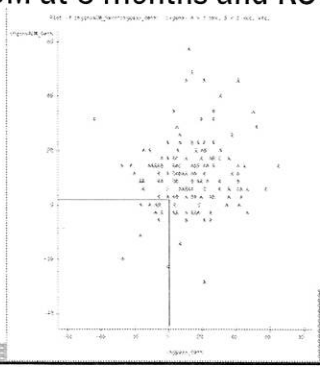

KOOS - Unilateral
Mean score
100
90
80
70
60
50
40
30
20
10
0
Enrollment
1 mon
2-3 mon
6 mon
1 yr
2 yr
Pain
Symptoms
ADL
Sport
Quality of Life


KOOS – Bilateral Left Knee
Mean score
100
90
80
70
60
50
40
30
20
10
0
Enrollment
1 mon
2-3 mon
6 mon
1 yr
2 yr
Pain
Symptoms
ADL
Sport
Quality of Life


KOOS – Bilateral – Right Knee
Mean score
100
90
80
70
60
50
40
30
20
10
0
Enrollment
1 mon
2-3 mon
6 mon
1 yr
2 yr
Pain
Symptoms
ADL
Sport
Quality of Life

Relationship between change in AOM at 6 months and KOOS

AOM - Change at 6 months

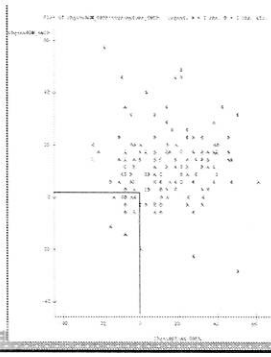


r = .148
P= 0.052

Pain – change in score at 6 months

Relationship between change in AOM at 6 months and KOOS

AOM – Change at 6 months



r = .079
P=.30

ADL *P= .23*
Sport P = .09
QOL *P = .09*

Symptoms – change in score at 6 months

OA Rehab Study: Interim Conclusions

- Most patients improved with treatment
- Only 18% have gone on to have a TKA
- Improvements in both ROM and KOOS scores seen at 1 month after treatment appears to be maintained through 1 year
- This nonoperative treatment approach is a good alternative for patients with knee OA