The Effect of Tibial Slope on Anterior Tibial Translation in the ACL deficient knee

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Tibial Slope & Cruciate Instability

Increasing tibial slope increases anterior tibial translation in the ACL deficient knee

Tibial Slope & Cruciate Instability

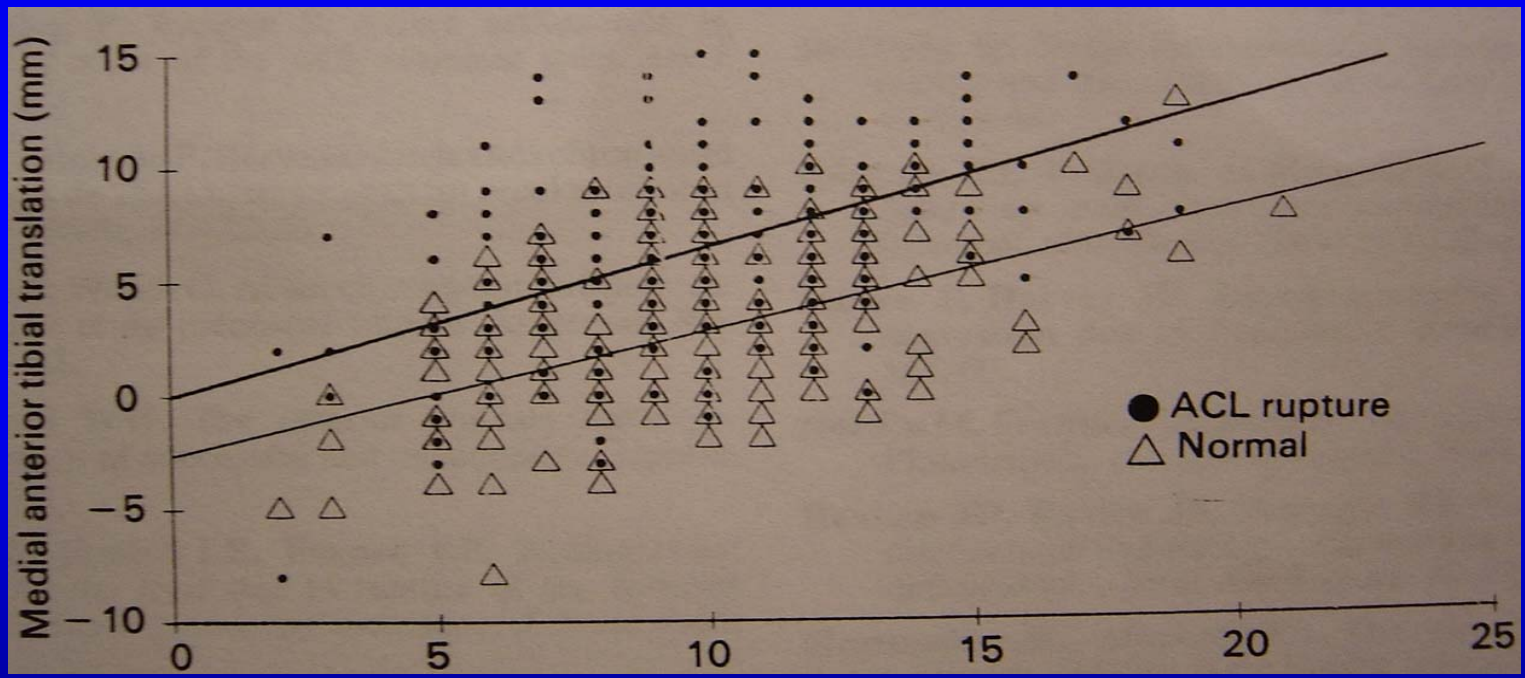
Henri De Jour & Michel Bonnin JBJS Br 1994
Tibial translation after anterior cruciate ligament rupture. Two radiological tests compared

- Lateral monopodal stance test showed that every 10 degrees increase in posterior inclination of the tibial plateau was associated with a 6 mm increase in anterior tibial translation

- The radiological Lachman test showed a 3 mm increase for every 10 degrees increase in tibial slope

Tibial Slope & Cruciate Instability

- Henri De Jour & Michel Bonnin JBJS Br 1994



- Greater tibial translation in the medial compartment

Tibial Osteotomies for ACL Instability

Slocum a vet was the first to describe proximal tibial osteotomies to decrease the tibial slope in dogs to treat ACL instability in 1980's

Tibial Osteotomies for ACL Instability

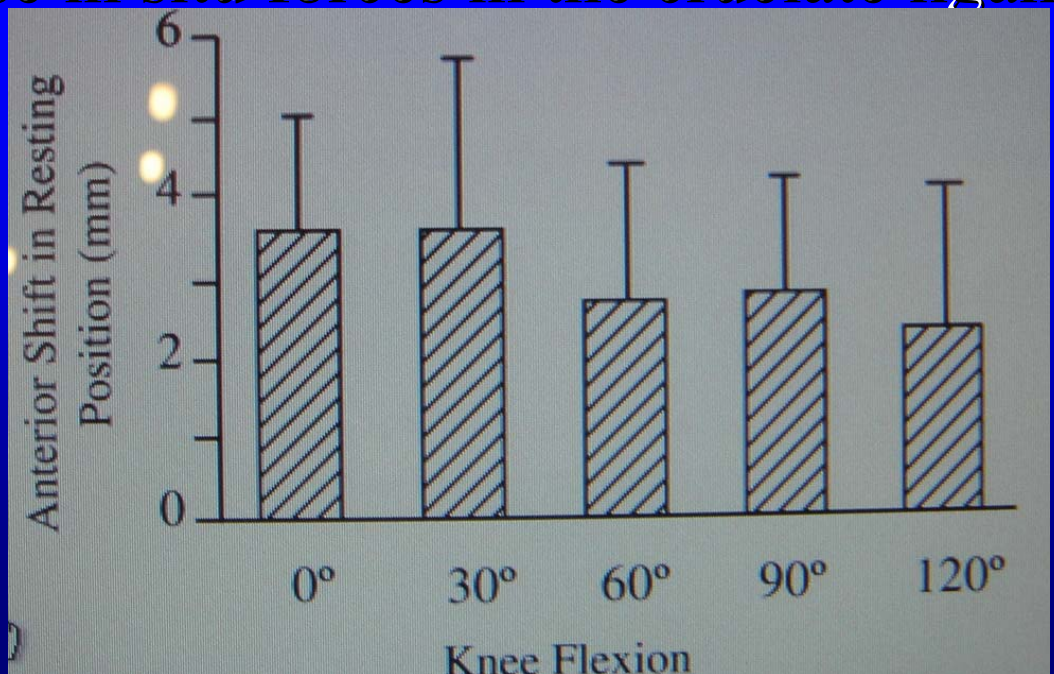
Giffin Harner & Amendola

- Dynamic cadaver and robotic studies have demonstrated a posterior opening wedge tibial osteotomy significantly decrease anterior translation in the ACL deficient knee

Tibial Osteotomies for ACL Instability

Giffin and Harner AJSM March 2004

- Anterior opening wedge osteotomy will result in a more anterior resting position of the tibia
- However it will not increase anterior translation or increase in situ forces in the cruciate ligaments



ACL Deficient Knee

On weight bearing the tibia is driven anteriorly

- Loading posterior horn of medial meniscus and the posteromedial tibial articular cartilage

Results in:

- Medial meniscal tears
- Chondral lesions of posteromedial tibia
- Posteromedial compartment OA

- Cupula – posterior osteophyte

Study Aims

- To determine the effect of tibial slope on anterior tibial translation in the ACL deficient knee using KT 1000
- To determine the effect of tibial slope on the outcome of ACL reconstruction
- To determine whether greater tibial slope will result in increased failures and degenerative change in the ACL reconstructed knee

Method

- Prospective study of 100 patients with isolated ACL deficiency with a normal contralateral limb
- One surgeon.
  Hamstring endoscopic reconstruction
  Fixation - Endobutton CL & Intrafix
  Accelerated rehab protocol

Patient Evaluation

Independent research assistant

Pre-operative collection of :

- Patient demographics
- Time to surgery
- Subjective & Objective IKDC
- KT 1000 – manual max

Intra-operative collection of:

- Meniscal status - % intact documented
  Chondral integrity

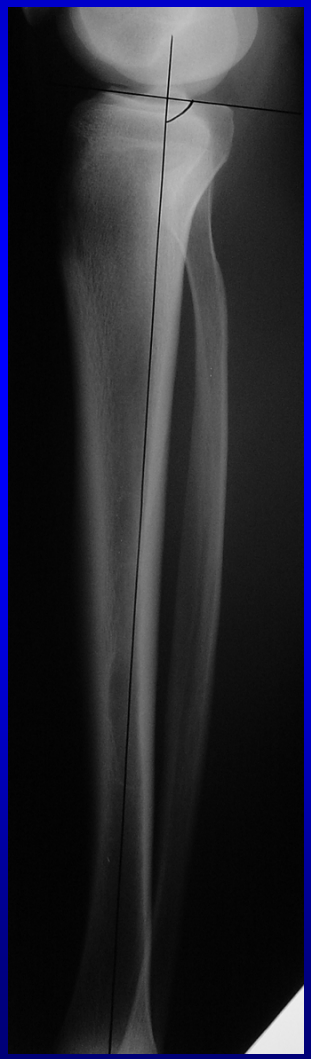
Study Group

- 100 patients over a 1 year period
- 73 male 27 female
- Mean age 28 (range 14 – 48)
- Mean time to surgery 23 months range (1 – 180)
- 78 sports related
- Objective IKDC 46 severely abnormal 54 abnormal
- Subjective IKDC mean 54 (range 24 – 79)

Meniscal Integrity

	Medial Meniscus	Lateral Meniscus
Normal	52%	66%
Partial Meniscectomy	24%	18%
Meniscal Repair	19%	8%
Tear no surgery	5%	9%

Tibial Slope



- Long lateral tibia

- Angle of medial tibial plateau and the shaft of the tibia

Method

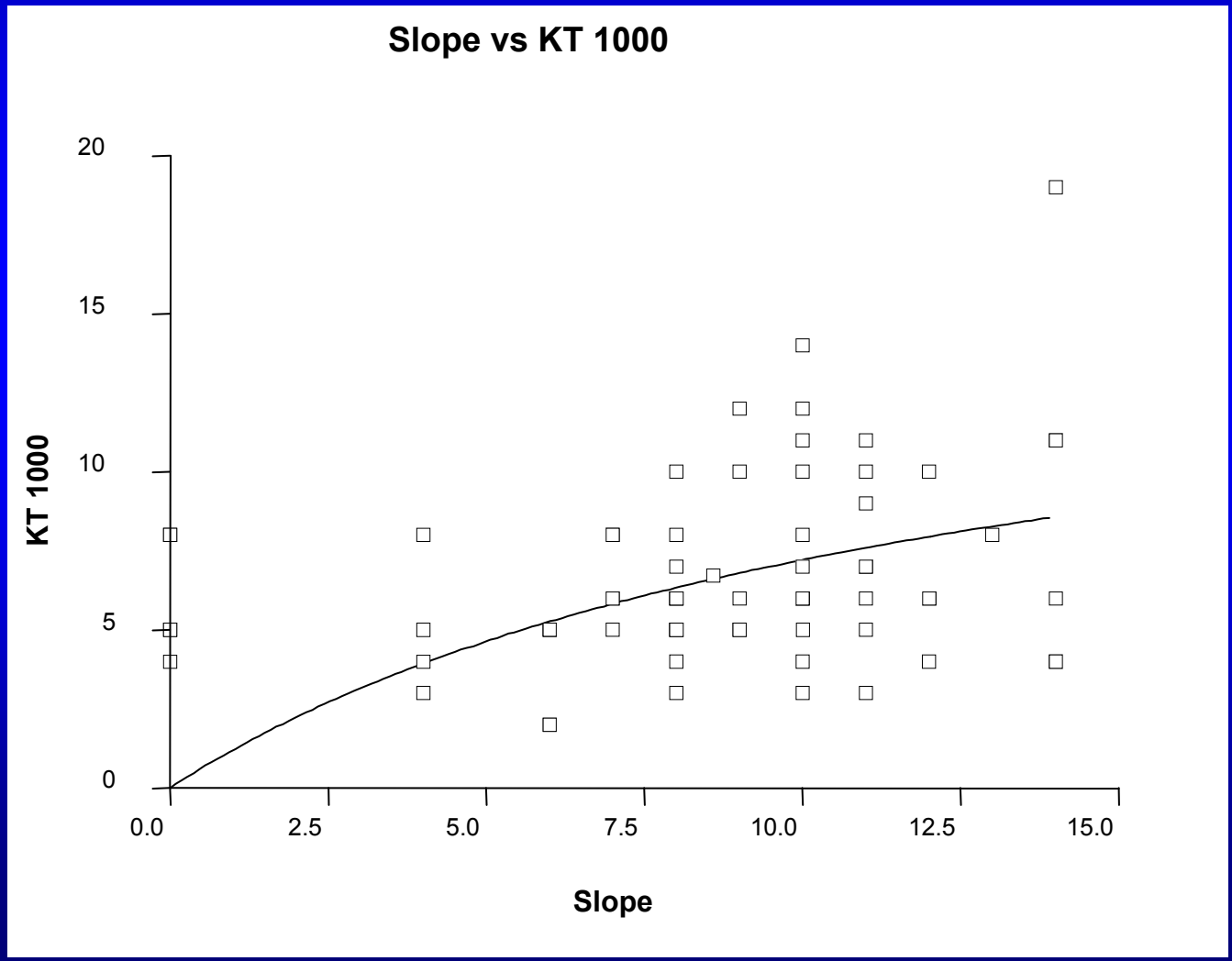
- Correlate:
  KT 1000 vs Tibial Slope
  KT 1000 vs Meniscal Integrity
  KT 1000 vs Time to surgery

  Adjust for these confounding variables

Results

- Significant correlation between slope and KT 1000 ($r = .29$, $p < .001$)
- Relationship increased when meniscal integrity is factored in ($r = .32$, $p <. 001$)
- No significant correlation between the integrity of the medial meniscus and KT 1000 ($r = -0.216$, $p=.079$)
- No significant correlation between the integrity of the lateral meniscus and KT 1000 ($r = -0.0216$, $p=.873$)
- No significant correlation between KT 1000 and time to surgery ($r = .015$, $p=0.905$)

Results



Conclusion

- There is a significant correlation between tibial slope and anterior tibial translation measured by KT 1000
- No significant correlation between meniscal integrity or time to surgery and KT 1000
- The effect of slope on outcome will be reported as the study progresses

Further Investigations

Determine the relationship between slope

- Graft failure
- Accelerated degenerative change

- Will need large numbers

- A Study for the ACL Study Group ?