

# RESULTS OF ACL PROCEDURES USING A SINGLE-BUNDLE TLS® TECHNIQUE WITH AT LEAST 1 YEAR'S CLINICAL FOLLOW-UP

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We have reviewed the results of 82 patients operated on between 2007 and 2008 by 3 surgeons experienced in ligament surgery and the TLS technique.

All the patients were operated on for a complete ACL rupture using a traditional, single-bundle TLS technique. This was a continuous, prospective series. Patients had a unilateral rupture and underwent a primary repair between 2 and 12 months post-trauma. Patients underwent a subjective evaluation pre- and post-operatively, providing subjective IKDC, Lysholm and Tegner scores. Objective evaluation of the knee was carried out by the operating surgeon pre- and post-operatively.

## Breakdown:

Sex ratio : F : 24 H : 58

Average age : 29 years, range from 14 to 51 years.

Côtés : Right: 45 Left:37

Sporting levels: Occasional hobby: 14%

Regular hobby: 30%

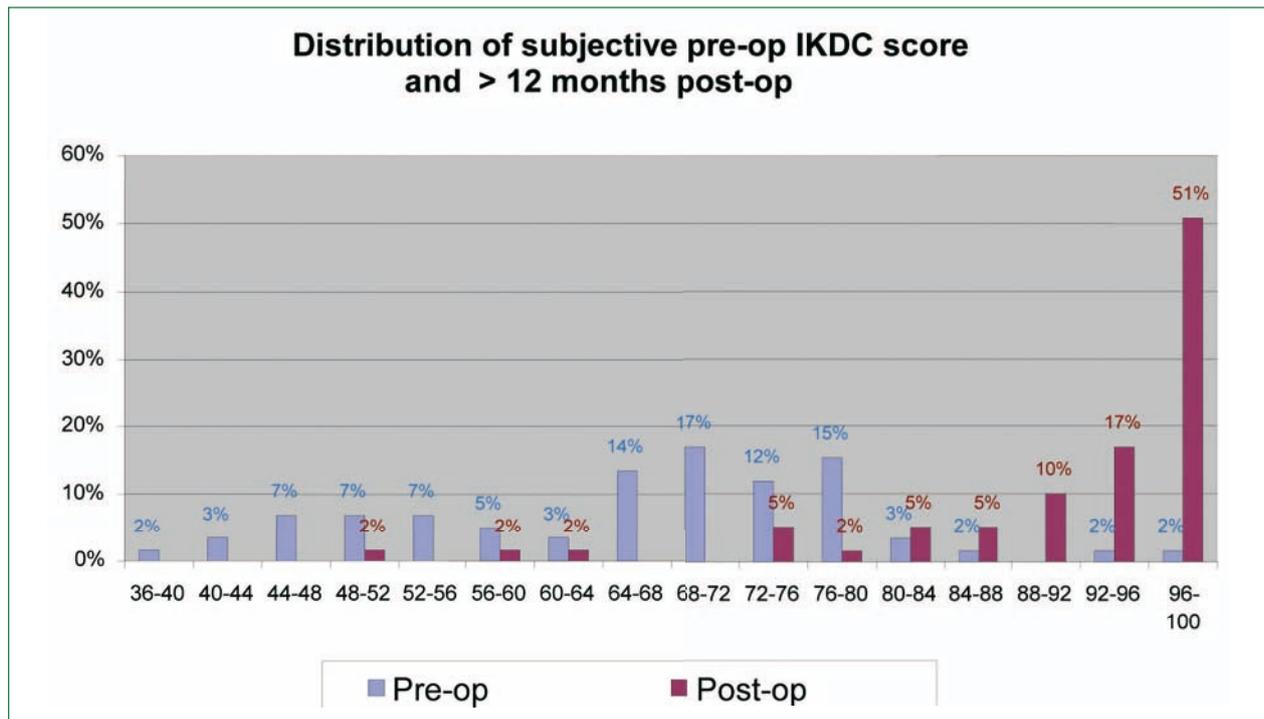
Competitive: 56%

## Results:

All patients were reviewed with an average follow-up of 19.4 months, ranging from 14 to 24 months.

43 knees presented a meniscal lesion, 20 of which involved the internal meniscus, 17 the external meniscus and 6 both. 19 were not treated. A partial meniscectomy was carried out in 23 cases, 7 lesions were sutured via endoscopy.

## 1. Subjective IKDC score

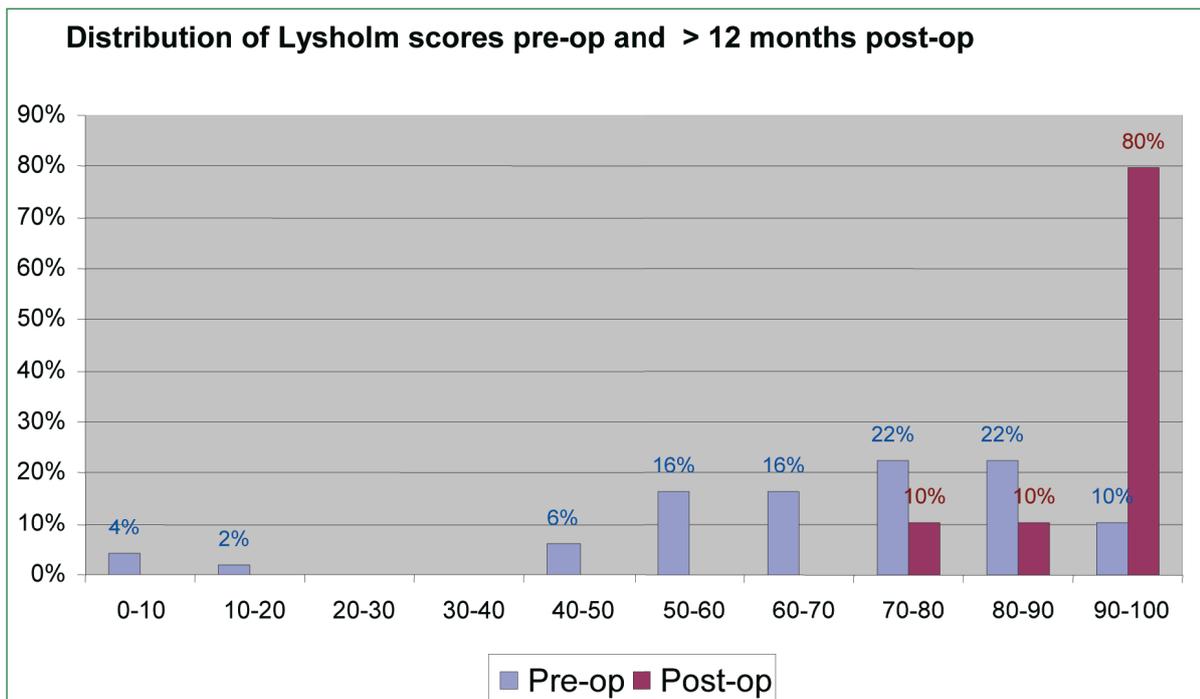


Average subjective IKDC increased from 66 to 92 points at 12 months minimum ( $p < 0.0001$ ). All patients except one (case at 48%) saw an improvement in their pre-op score, with an average improvement of 44%.

Details of 3 cases < 70 points:

- case at 48%: algodystrophy, patellar tendinitis and neuroma on the anterointernal arthroscopy scar. The patient is not satisfied (score of 2/10) and would not repeat the operation.
- Case à 60%: algodystrophy and arthrofibrosis: extension deficit > 10°.
- Case at 64%: pain and arthrofibrosis: extension deficit 3° and flexion deficit 10°.

## 2. Lysholm Score



The average Lysholm score increased from 68 to 93 points at 12 months minimum ( $p < 0.0001$ )

## 3. Pain results

Pain at 12 months		Knee	Thigh	Leg
<b>Frequency</b>	Never	56%	98%	98%
	Rare	27%		
	Occasional	12%	2%	2%
	Frequent	4%		
<b>Intensity</b>	Light	71%	100%	
	Average	21%		100%
	Acute	8%		
<b>Location</b>	anterior	48%		
	posterior	19%	100%	100%
	internal	19%		
	variable	10%		
	diffuse	4%		
<b>Circumstances</b>	Resting			
	During effort	50%	50%	50%
	Linked to movement	18%	50%	50%
	After effort	23%		
	No reason	9%		

Pre-op, the average pain score was 3.4 on a scale of 0 to 10. At the last post-op control, this value was 1.1. The drop is statistically significant ( $p < 0.0001$ ). 8% of patients evaluate their knee pain as slightly more frequent post-op (increase of 1 or 2 points)

#### 4. Subjective stability results

To the question "What is the highest level of activity you can reach without your knee giving way?" the answers were:

	Very intense activity	Intense activity	Moderate activity	Gentle activity	No activity
<b>Pre-op</b>	2%	12%	45%	40%	2%
<b>&gt; 12 months</b>	62%	17%	14%	7%	0%

% of patients are not yet fully confident in their knee.

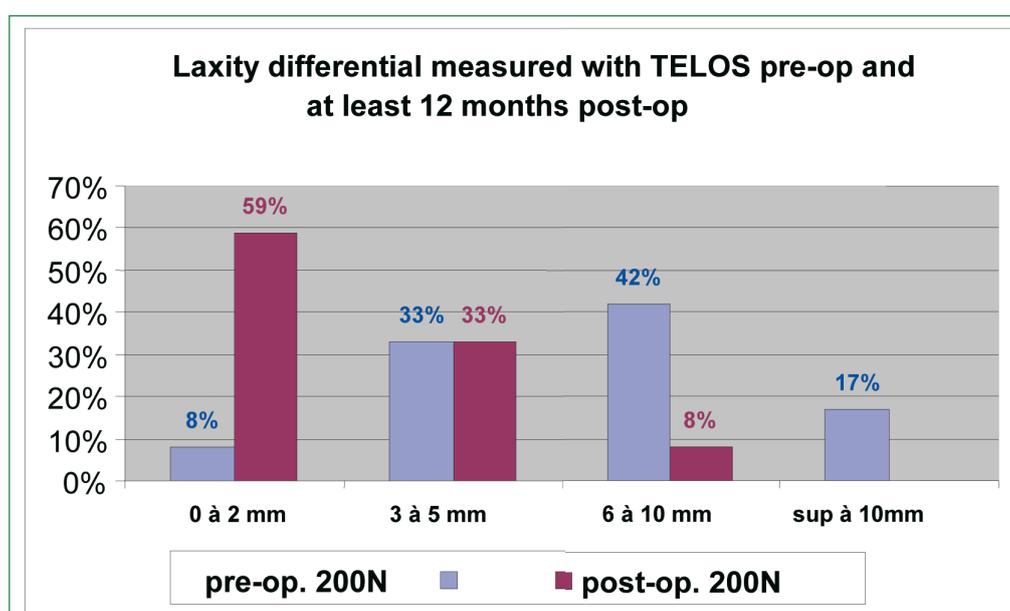
#### 5. Objective IKDC Score

	% A	% B	% C	% D
<b>Pre-op</b>	2%	6%	71%	21%
<b>&gt;12 months post-op</b>	33%	50%	13%	4%

The 2 cases in category D are patients who developed an algodystrophy.

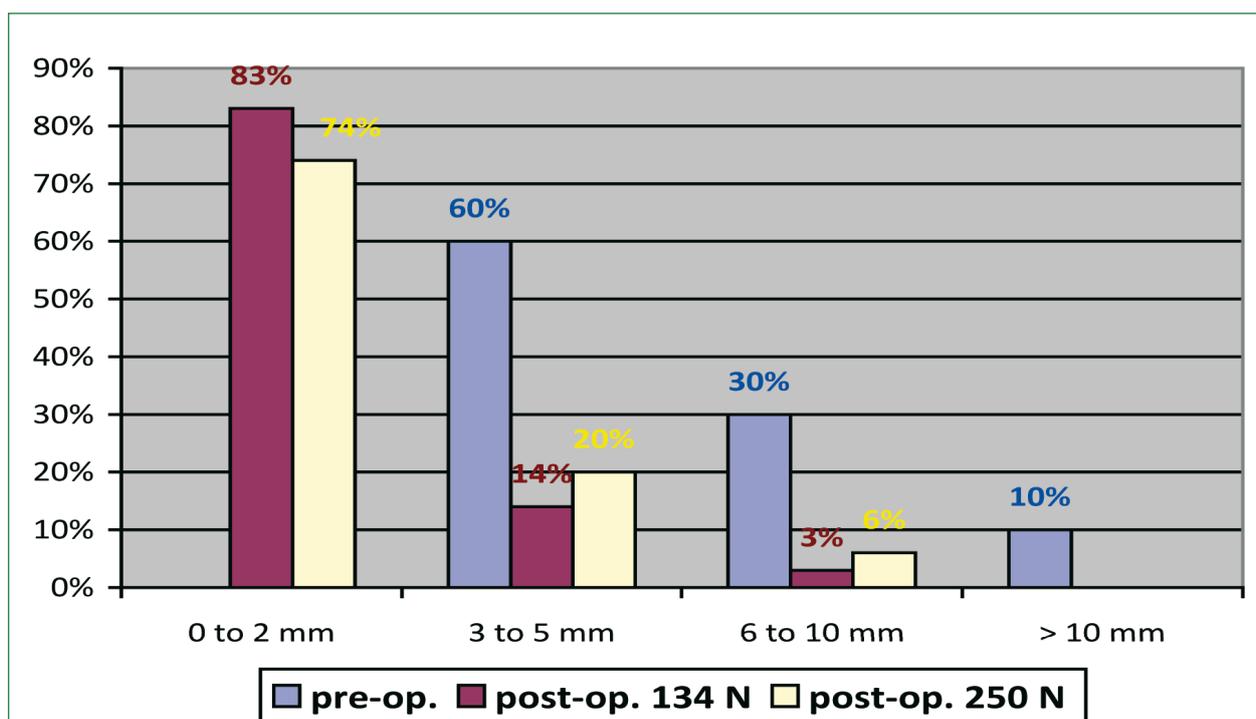
The 7 cases in category C are 3 patients with laxity (6 to 10 mm), 2 patients with pain in the graft harvesting site or the thigh, 1 patient with knee pain and one patient with a chronic effusion.

#### 6. Laxity measured with Telos at 200 N



At 200 N, with Telos there are 2 cases of differential laxity over 6 mm. Average Telos was reduced from 6.8 mm pre-op to 2.2 mm post-op. ( $p < 0.0001$ )

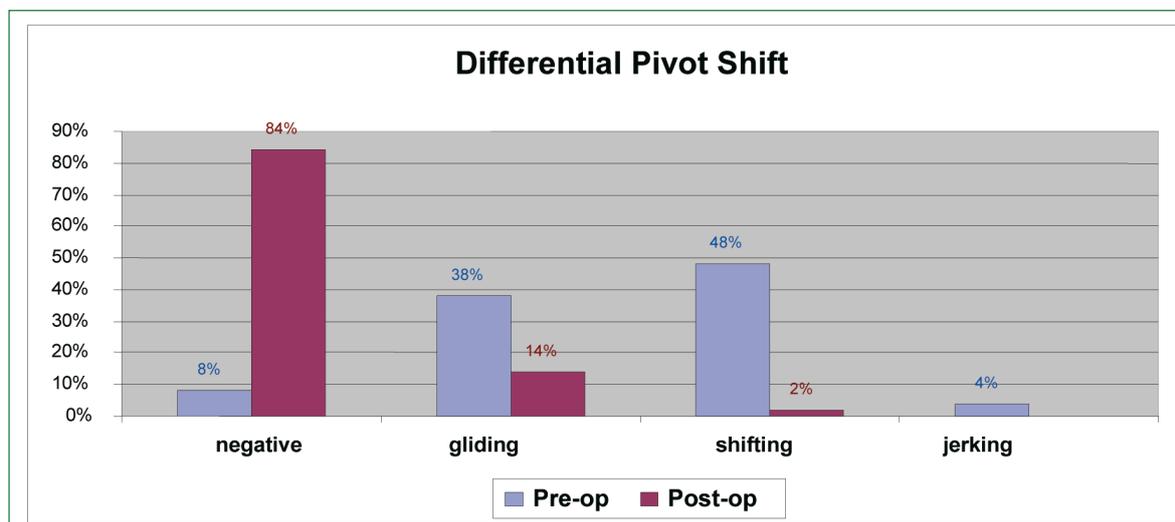
## 7. Laxity measured with GNRB.



At 134 N, there is one case of differential laxity greater than 6 mm but 2 cases if effort is made at 250 N. Average laxity dropped from 6.7 mm to 1.7 mm at 134 N.

At 250 N, the percentage of laxities between 3 and 5 mm or > 6 mm increased. The laxity rate < 6 mm is similar with both methods, if we compare Telos at 200N (92%) and GNRB at 250N (94%).

## 8. Pivot Shift.



## 9. Complications

There were no thromboembolic complications or infections.

One patient had a tibial screw ablation at 8 months for persistent pain.

There were no re-ruptures of the plasty, but 4 cases of laxity > 6mm (Telos or GNRB measurements, taken with pressure > 200N), not hampering sporting activities.

- 2 patients had major algodystrophy with residual stiffness.
- 1 patient had an arthrofibrosis with extension deficit (3°) and flexion deficit (10°).
- 1 patient developed a Cyclops syndrome which was treated arthroscopically at 6 months post-op.

## 10. Evaluation of satisfaction

### a. Patients

Score      Average score at 3 months: 8.3 /10  
              Average at 6 months: 8.4 /10  
              Average at 12 months: 9.1 /10

*"Would you redo the operation?" (Answers after 12 months)*

86% definitely,  
10 % with some hesitancy,  
4 % certainly not.

### b. Surgeons' Score

Score      Average at 3 months: 8.2 /10  
              Average at 6 months: 8.7/10  
              Average at 12 months: 9/10

Both patients' and surgeons' satisfaction scores correspond and correlate closely with any complications occurring: pain, limited mobility, algodystrophy... and are determined in the first few months. Paradoxically, the same cannot be said of patients' scores regarding objective stability of the knee.

Early identification and treatment of algodystrophy would seem to be decisive in establishing a long-term prognosis for the knee.

## 11. Literary Review

This study has been compared with a meta-analysis by Lewis et al. in 2008, covering 11 prospective and randomised studies of hamstring procedures (4 strands) and patellar tendon repairs. The minimum clinical follow-up was 2 years.

	Meta-analysis, Lewis et al.	TLS study
<b>Objective IKDC:</b>		
A	35% 	33% 
B	44%	50%
C	15%	13%
D	6%	4%
<b>Laxity ≤ 3 mm</b>	77%	83% with GNRB 59% with Telos
<b>3 mm &lt; Laxity &lt; 6 mm</b>	8%	14% with GNRB 33% with Telos
<b>Laxity ≥ 6 mm</b>	5%	6% with GNRB 8% with Telos
<b>Laxity &gt; 10 mm</b>	10%	0
<b>Pivot shift present</b>	19%	16%

911 patients were included in this study.

The results concerning the objective IKDC in the TLS study correspond to those from another study (Biau DJ et al): Class A: 33%, class B: 45% in the hamstring group.

The laxity measurements in the TLS study are particularly strenuous (pressures of 200N or 250N), which is not the case in the published literature (KT-1000 at 134 N or with maximum manual traction). Despite this, the results are identical in the TLS study - 6 or 8% laxity > 6mm - compared with 5% in the Lewis study. It is worth wondering what the laxity results would be with a more stringent arthrometric method ...

## Conclusions

The results of the TLS study, covering 82 cases and 3 surgeons' experiences, are very satisfactory from both subjective (IKDC and Lysholm Scores) and objective (IKDC, laxity measurement, Pivot-shift) points of view.

Complications mainly involve the occurrence of algodystrophy and arthrofibrosis. Post-operative pain management and follow-up of rehabilitation would appear to be essential in detecting such complications as early as possible.

Further studies are necessary to confirm these preliminary results.

## References

- Biau DJ, Tournoux C, Katsahian S, Schranz P, Nizard R. ACL reconstruction, a meta-analysis of functional scores. Clin Orthop Rel Res. 2007
- Lewis PB, Parameswaran D, Rue JP, Bach BR. Systematic review of single bundle ACL reconstruction outcomes. Am J Sports Med 2008 ; Vol 36, N° 10 : 2028-2036
- Robert H, Nouveau S, Gageot S, Gagnière B. A New Knee Arthrometer: the GNRB: experience in ACL complete and partial tears. Ortho Trauma Surg Research. 2009; 95: 171-176