

ACL Trauma Score by SFA

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DISCLOSURE



SFA and Fondation Paul Bennetot have provided support and funding for this study

KNEE LIGAMENT INJURIES = 1 PERSON IN A HUNDRED PER YEAR *

Medical and surgical challenge with a socio-economic impact.

Before any treatment, a diagnosis must be made

to preserve the future of the patient and his knee

→ The diagnosis of a anterior cruciate ligament rupture is confirmed by clinical examination. (Kostov sensitivity of 94.5%**)

** Kostov H, Arsovski O, Kostova E, Nikilov V. Diagnostic assessment in anterior cruciate ligament (ACL) tears. Prilozi. 2014; 35(1): 209-218.

* Gianotti SM, Marshall SW, Hume PA, Bunt L. Incidence of anterior cruciate ligament injury and other knee ligament injuries: a national population-based study. J Sci Med Sport 2009; 12: 622-7.



but requires expert hands

ACL INJURIE : A DIFFICULT DIAGNOSIS IN IMMEDIATE POST TRAUMATIC PHASE:

Studies	Percentage of ACL rupture correctly diagnosed during initial management
<u>Parwaiz et al (2016)</u>	14,4% (MG et U)
<u>Perera et al (2013)</u>	19,2% (U)
<u>Ayre et al (2015)</u>	12,7% (U)
<u>Arastu et al (2015)</u>	13,5% (MG et U)
<u>Hartnett et al (2001)</u>	16% (MG)
<u>Guillodo et al</u>	25% (U)

MG : generalist practitioner , U: Emergency doctor



Difficult testing

For Noyes et al 10% good diagnosis (and 30% orthopaedic consultant...)

This was despite 90 per cent of patients having a typical history and all having unequivocal physical signs.

**Can a score, without testing,
improve the accuracy of the
initial diagnosis?**

THE STEPS OF THIS STUDY



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www.sofrarthro.org

→ SET THE GOALS

- Improve acl tear diagnosis
- Simple, reliable, reproducible = no test runs
- For health professionals

→ THE STUDY

- Choose the items
- Test the score, augment the data
- Search for the best coefficient for each item
- Search for profil influence

→ MEET REGULATORY REQUIREMENTS

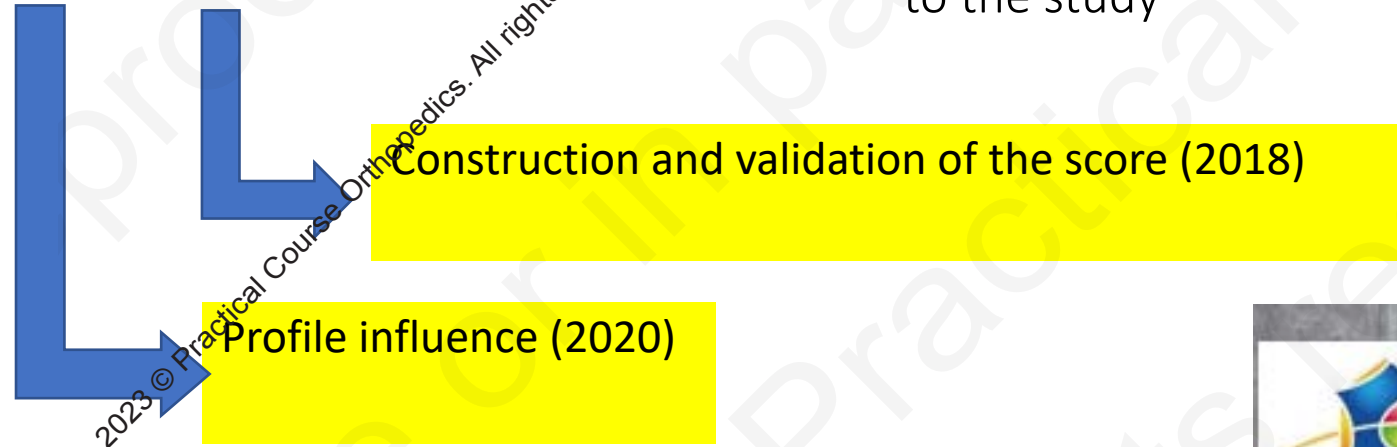
- Etude : SFA-ACL-TS-2015
- IDRCB : 2016-A00126-45
- Avis CCTIRS: 23/03/2016
- Avis favorable CPP: 22/06/2016

« Only » 330 patients in 3 years
but



Inclusion criteria:

- age between 18 and 55 years
- knee trauma occurring less than 9 days before the consultation
- no bony lesions (fractures) on the standard radiographic
- patient affiliated to a social security system
- patient informed and having expressed his or her non-objection to the study



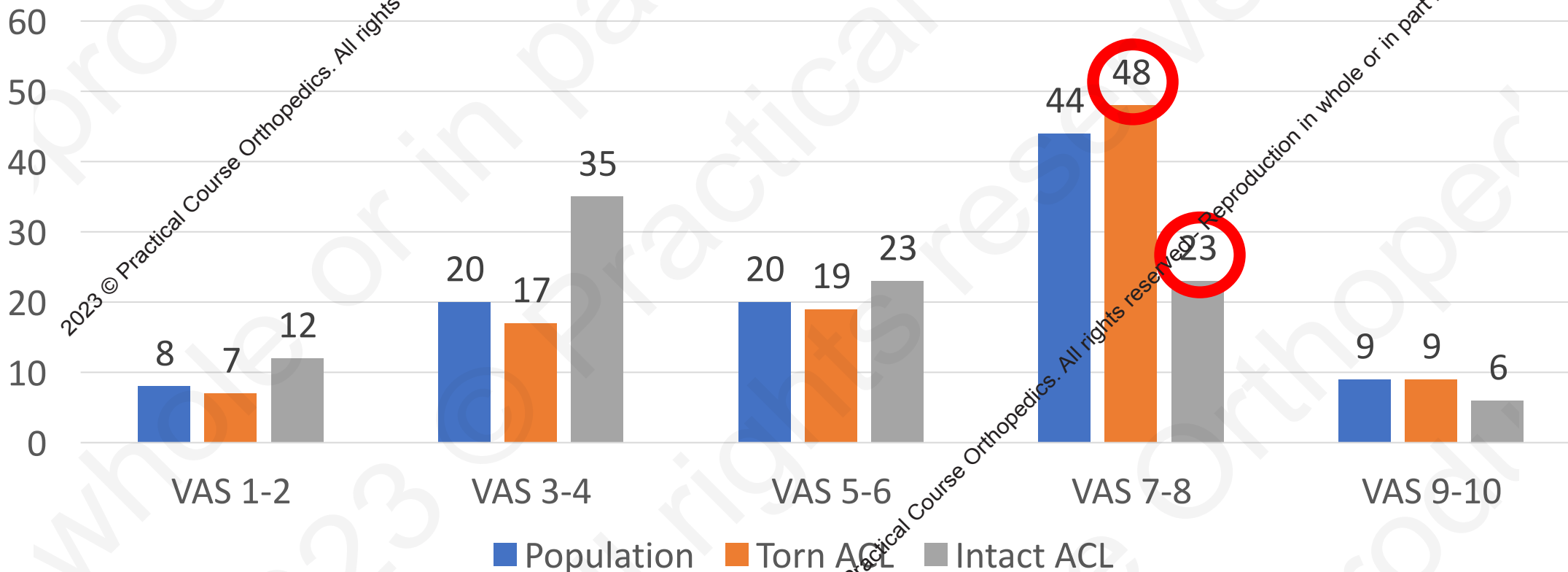
Construction and Validation of the score

- 5 Items :
 - PAIN (VAS)
 - IMMEDIATE FUNCTIONAL IMPOTENCE
 - PERCEPTION OF A CRACK
 - INSTABILITY AT INJURY
 - KNEE EFFUSION

Construction and Validation of the score

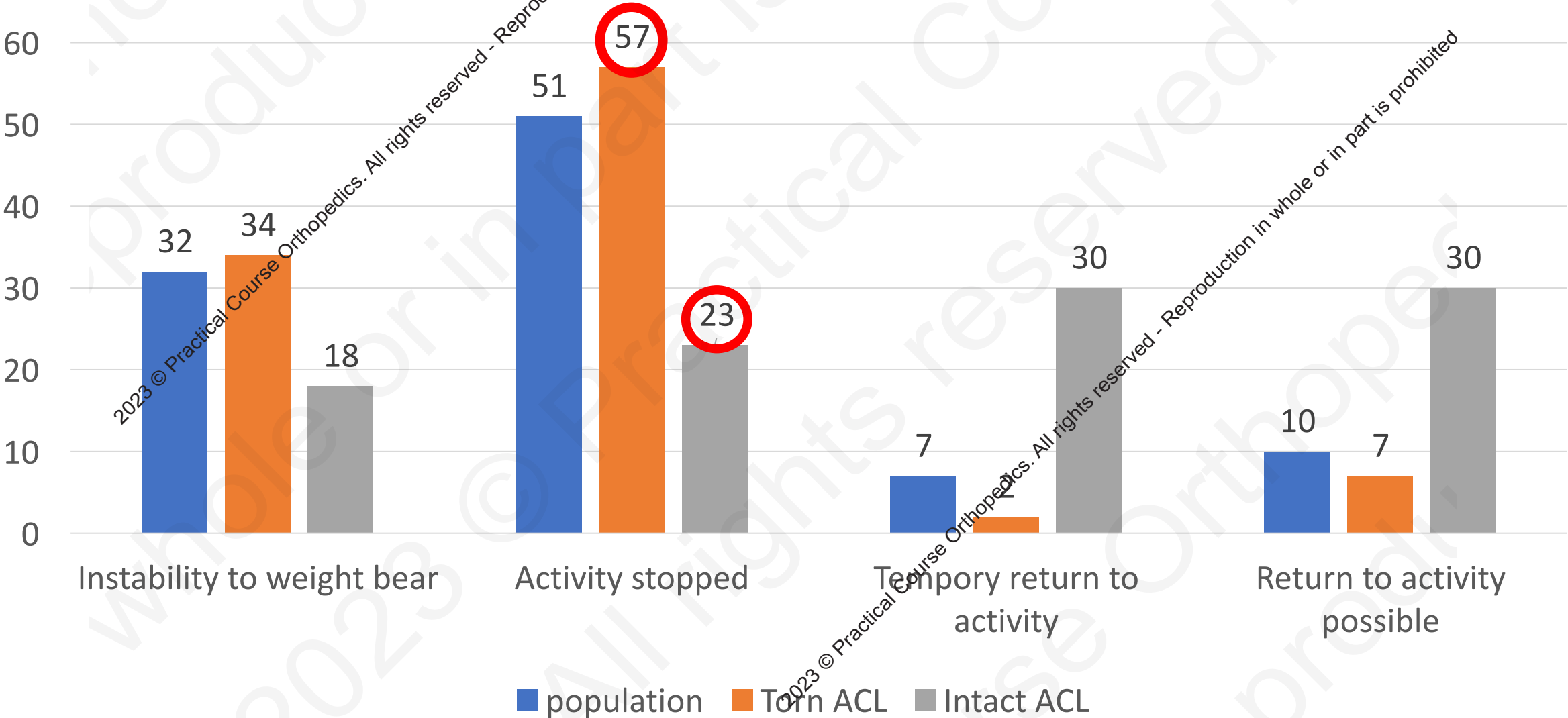
PAIN ($p < 0,004$)

Percentage of each group for a VAS



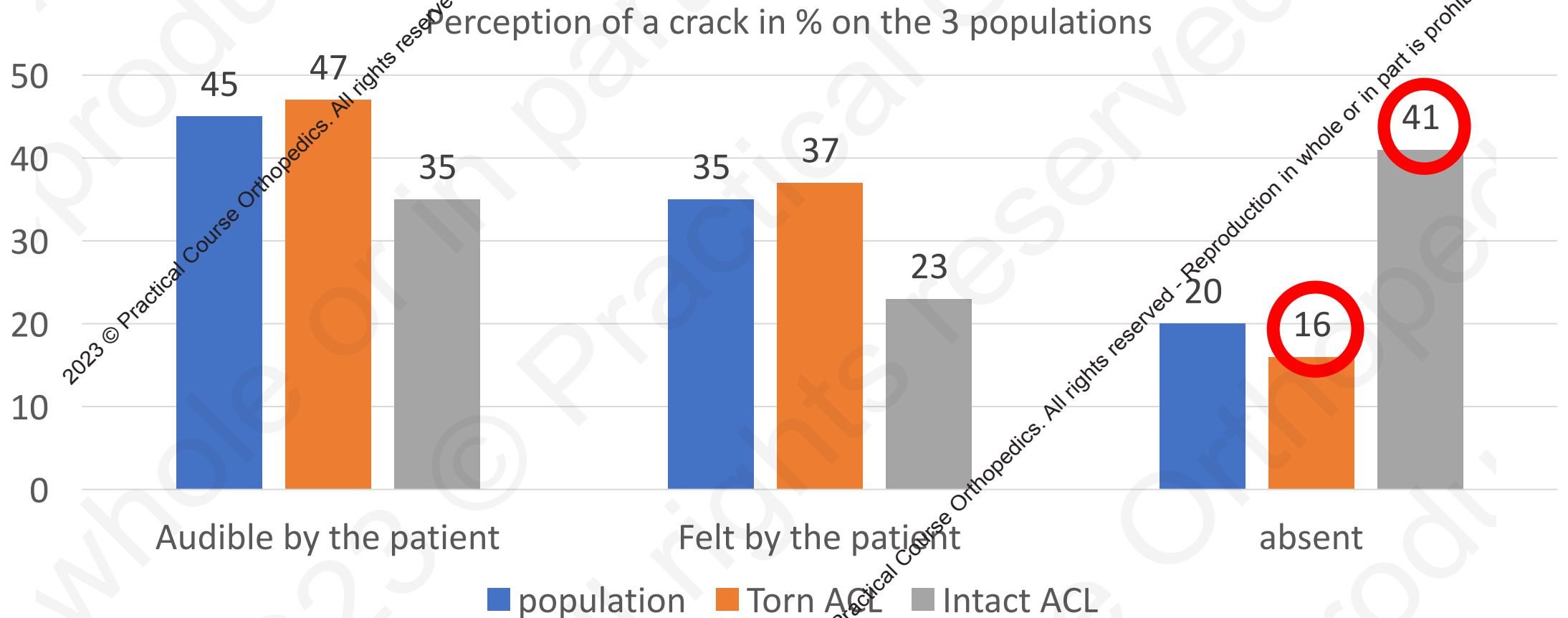
Construction and Validation of the score

IMMEDIATE FUNCTIONAL IMPOTENCE ($p < 0,001$)



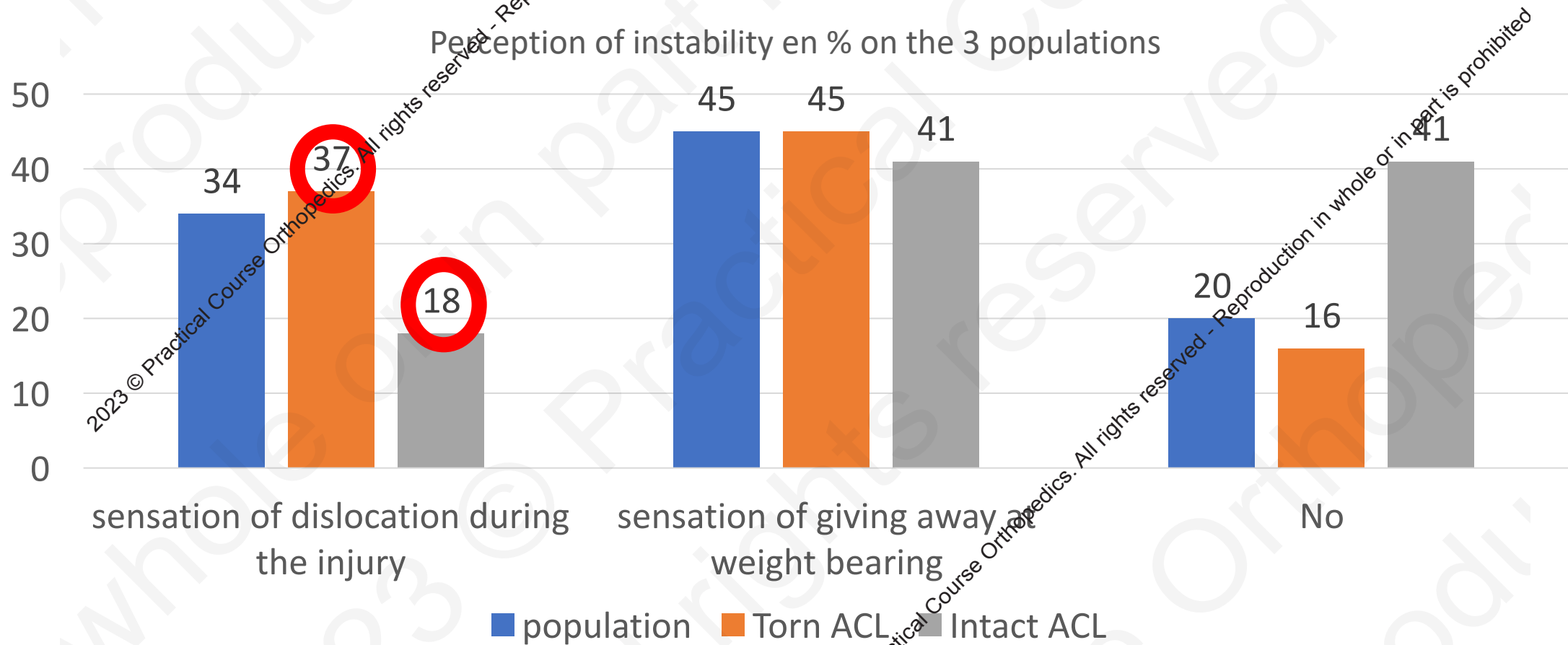
Construction and Validation of the score

Perception of a CRACK (p=0,017)



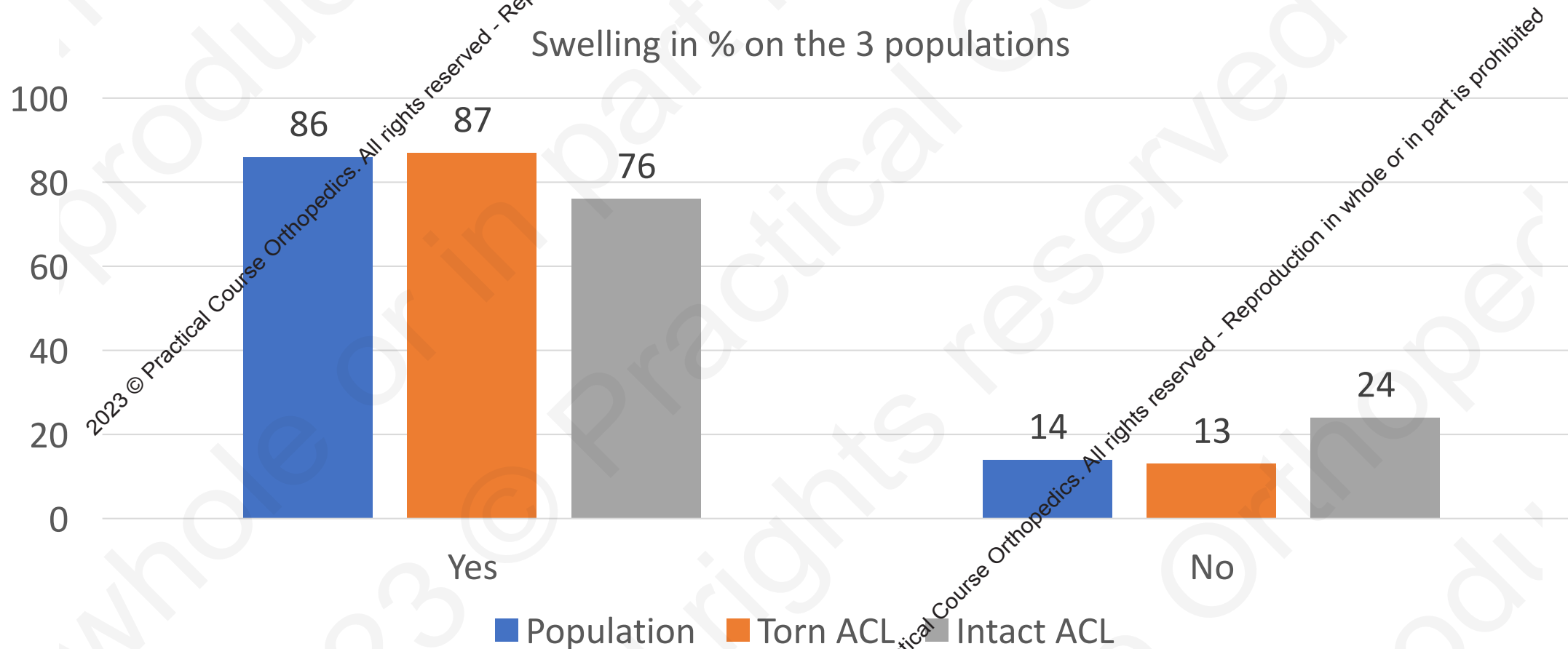
Construction and Validation of the score

INSTABILITY AT INJURY ($p=0,018$)



Construction and Validation of the score

KNEE EFFUSION (ns/p= 0,24)



Construction and Validation of the score

Determination of the threshold
significativity for each item by ROC curve

	threshold	Sensibility	Spécificity	PPV	NPV
Pain	> 2 = VAS > 7	42%	75%	64%	72%
Impotence	> 1	86%	43%	62%	73%
Cracking	> 0	72%	55%	65%	67%
Instability	> 0	68%	66%	68%	65%
effusion	1 If present	87%	31,5%	58%	31%

Item	Odd Ratio	Confidence interval 95%	P
Effusion	2,78	[1,25-6,20]	0,0125
Pain	2,16	[1,09-4,28]	0,0274
Cracking	3,47	[1,82-6,64]	0,0002
Impotence	4,08	[1,95-8,56]	0,0002
Instability	4,28	[2,23-8,20]	< 0,0001

the performance of the score is increased
by the association of significant items

THE SCORE (ON 12 POINTS)

Value	0	1	2	3	4
Item					
Pain (VAS)	0-1-2	3-4	5-6	7-8	9-10
Immediate functional impotence	Return to the activity possible	Temporary return	Activity stopped	Instability to weight bear	
Cracking	No	Felt by the patient	Audible by the patient and/or surrounding people		
Instability at injury	No	Sensation of giving away at weight bearing	Sensation of dislocation during the accident		
Knee effusion	No	Yes			

RESULTS WITH THIS SCORE

- **Torn ACL very rare if ACL Trauma Score <5**
 - Sensibility 99% / Specificity 18%
 - **NPV=87%**
- **Torn ACL very probable if ACL Trauma Score >7**
 - Sensibility 42%/ Specificity 82%
 - **PPV=83%**
- **Torn ACL probable if ACL Trauma Score 5, 6, 7**
 - Sensibility 90%/ specificity 59%

A LOT BETTER THAN WITH EMERGENCY CLINICAL EXAMINATION !

Studies	% of ACL rupture diagnosis correctly performed (GPs: general practitioners - ER physicians)
Parwaiz et al (2016)	14,4% (GP and ERP)
Perera et al (2013)	19,2% (ERP)
Ayre et al (2015)	12,7% (ERP)
Arastu et al (2015)	13,5% (GP and ERP)
Hartnett et al (2001)	16% (GP)
Guillodo et al (2008)	25% (ERP)
SFA Score (2022)	87% NPV if < or = to 4 (ACL intact) 83% PPV six or = to 8 (ACL injured)

Profile influence

Profil du patient		Population totale	LCA rompu (n=165)	LCA sain (n=88)
Sexe (M/F)	N=238	149 (63%) / 89 (37%)	100 (63%) / 59 (37%)	49 (62%) / 30 (38%)
IMC (kg/m ²)	N=232	23.5 (16.1-41.9)	24 (17.4-41.9)	23.4 (16.1-34.3)
Age à la blessure (années)	N=251	28 (18-54)	28 (18-54)	27.5 (18-54)
Tegner *	N=246	6 (1-10)	7 (1-10)	5 (1-10)
Délai accident – consultation (jours) *	N=252	4 (0-34)	5 (0-34)	1 (0-32)
Côté (Gauche/Droit)	N=249	110 (44%) / 139 (56%)	68 (42%) / 95 (58%)	42 (49%) / 44 (51%)
Mécanisme lésionnel				
Varus – Rotation interne (non/oui)	N=238	180 (76%) / 58 (24%)	112 (73%) / 41 (27%)	68 (80%) / 17 (20%)
Valgus – Rotation externe (non/oui)	N=238	124 (52%) / 114 (48%)	75 (49%) / 78 (51%)	49 (58%) / 36 (42%)
Hyperextension (non/oui)	N=238	202 (85%) / 36 (15%)	125 (82%) / 28 (18%)	77 (91%) / 8 (9%)
Saut réception (non/oui)	N=238	192 (81%) / 46 (19%)	123 (80%) / 30 (20%)	69 (81%) / 16 (19%)
Changement de direction (non/oui)	N=238	174 (73%) / 64 (27%)	106 (69%) / 47 (31%)	68 (80%) / 17 (20%)

Gender, BMI, injury's mechanism, age, Tegner score, delay accident consultation

Profile influence

- Gender, BMI, injury's mechanism, age , Tegner score, delay accident consultation don't modify the sensibility of the score.



The score can be applied at each patient who have a knee injury.

**Only the diagnosis of ACL lesion : torn or intact
modifies the score**

The smartphone application

- No data saved
- An email sent to the patient with password
- An email to the practitioner



Test du Genou



Home



Click the button below to start a new evaluation



Entered data are never saved either on the device or on a server. You will however be allowed to send the final score via e-mail.

This test has been designed for adult patients and can be less relevant for children.

The choice of a value leads to the next item

Score ✕

1 out of 5

Pain (VAS)
Pain assessment at injury

1 - 2	>
3 - 4	>
5 - 6	>
7 - 8	>
9 - 10	>

Score ✕

2 out of 5

Direct functional impotence

Return to activity was possible	>
Return to activity was temporary	>
Cessation of activity	>
Unable to weight bear	>

Score ✕

3 out of 5

Cracking at injury

None	>
Felt by the patient	>
Audible to the patient or family	>

Score ✕

4 out of 5

Instability at injury

None	>
Giving way sensation at weight bearing	>
Dislocation sensation during the injury	>

Score ✕

5 out of 5

Effusion
Was the knee swollen within the 24 hours following the injury?

No	>
Yes	>

Score finished!

Final score :

2

Recommendations :

- ✓ Minor knee trauma. An appointment at a doctor is recommended. No MRI necessary.

Score finished!

Final score :

5

Recommendations :

- ⚠ Moderate knee trauma. A MRI is recommended with an appointment at an orthopedic surgeon or a sports doctor.

Score finished!

Final score :

9

Recommendations :

- ! Severe knee trauma. It is recommended to have a MRI as soon as possible as well as an appointment at an orthopedic surgeon.

Automatic calculation → 3 possibles results
Green 4 < 5 to 7 < 8 Red

Thanks to the team

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The task force



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SFA

2023

LYON

CENTRE DES CONGRÈS

14.15.16 DÉCEMBRE

PRÉSIDENTE DU CONGRÈS :

ARNAUD GODENÈCHE

BERTRAND SONNERY COTTET

SYMPOSIA

- Lésions du LCA et ligament collatéral médial.
N. Bouguennec, E. Cavaignac
- Score SFA - récurrence d'instabilité. *L. Neyton, X. Ohi*
- Traitement arthroscopique de la tendinopathie corporelle et d'insertion du tendon d'Achille.
M. Andrieu, A. Thiounn

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