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A review of the use of knee bracing after ACL injury in the pediatric population

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Ryan Daniel¹, BScN Student, Daniel L Benoit², Ph.D

¹Honours Biomedical Sciences, Faculty of Science, ²Faculty of Health Sciences, University of Ottawa

Introduction

The anterior cruciate ligament is essential to proper functioning of the knee joint. Its role is to protect the forward sliding of the tibia on the femur and checks hyperextension of the knee. [7] Due to its prominent role in weight bearing activities the ACL is very susceptible to injury. [7] In fact, the incidences of these types of injuries continue to rise especially in children. [7]

While no evidence was presented, discussions with orthopedic surgeons and physiotherapists support the notion that knee braces are widely prescribed in the pediatric population to treat these injuries. Following ACL injuries, children are commonly prescribed knee braces either as a nonoperative form of treatment or for postoperative rehabilitation and return to play. Despite their widespread use by orthopedic surgeons in Canada, the evidence to support this rationale is unclear. Both applications of knee braces were reviewed in this study to determine whether there is evidence to support the use of knee bracing in children following ACL injuries or if better methods should be established in the testing and treatment of these injuries.

Objectives

Research Question: Does the evidence support the use of knee bracing following ACL injury in children?

Hypothesis: The hypothesis, based on preliminary findings in regards to the research question, is that the literature will not support the use of knee bracing following ACL injury in children.

Methodology

Literature review was conducted through the Pubmed, Google Scholar and University of Ottawa library databases. Articles from 1988 to 2016 were retrieved and separated based on whether they were primary or secondary sources. Primary sources were then further separated into evidence for the use of bracing as a nonoperative form of treatment and evidence for the use of bracing postoperatively. Secondary sources, such as other literature or systematic reviews were used as background knowledge. Lack of evidence in the literature, meant that every source used was not examining the use of knee braces specifically in the pediatric population.

Results

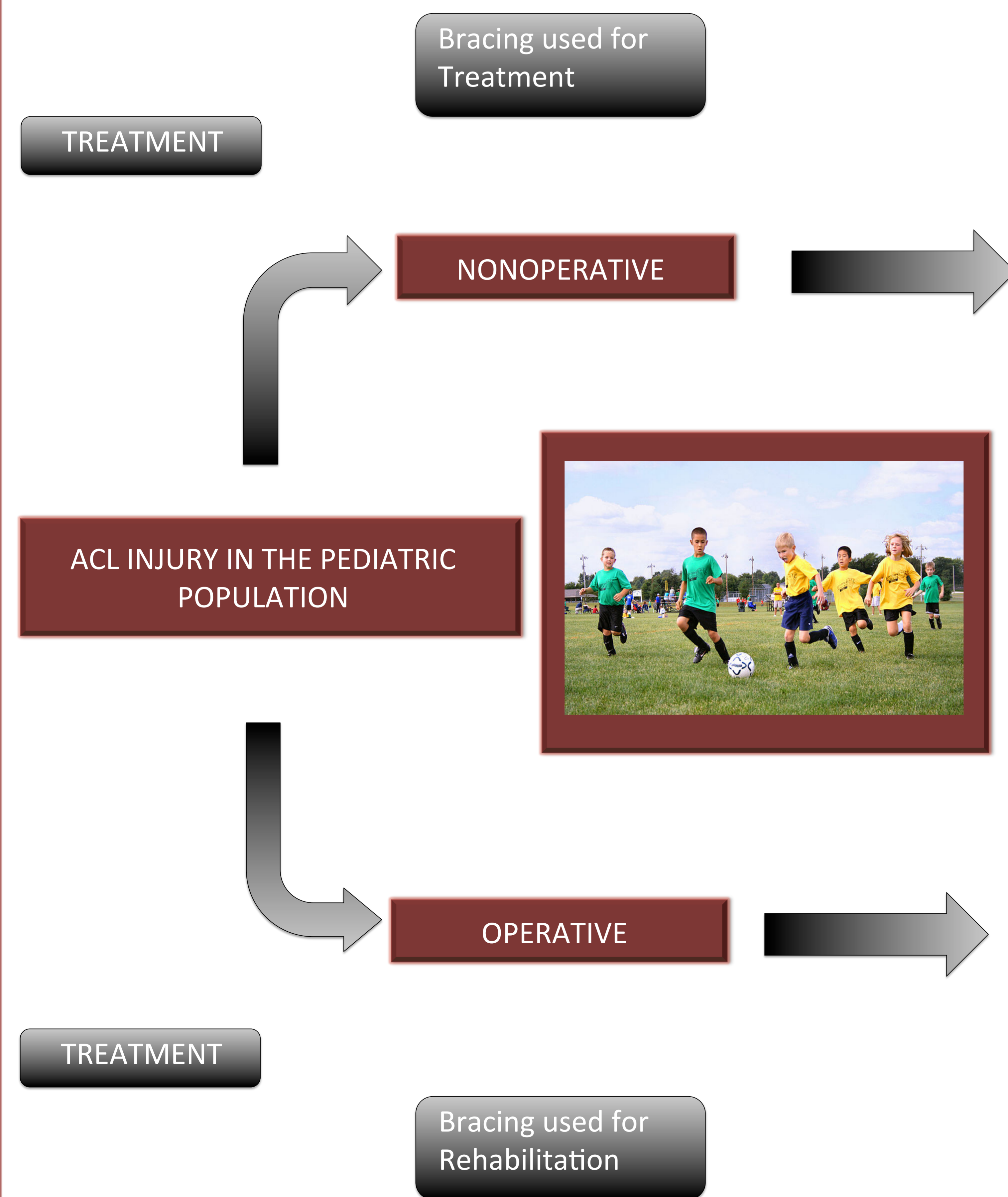


Table 1. Studies related to the use of bracing as a conservative form of treatment

Study/Year	Significant Findings
[2]Graf et al. (1992)	<ul style="list-style-type: none"> 7/8 braced patients developed new meniscal pathology 2/4 operative patients developed now meniscal pathology
[8]Lee et al. (2016)	<ul style="list-style-type: none"> Hinged knee braces only absorb 18% of force and 2.7% of torque at the knee Brace reduced mechanical load on the knee very minimally
[9]McCarroll et al. (1988)	<ul style="list-style-type: none"> Only 7 subjects returned to sports, experiencing giving way, effusions and pain in braced group All 24 subjects returned to sport in surgical group
[11]Ramsey et al. (2001)	<ul style="list-style-type: none"> No reductions in anterior tibial translations were observed using a knee brace – the primary motion causing ACL injuries
[13]Streich et al. (2010)	<ul style="list-style-type: none"> Better clinical and functional results in terms of knee stability and higher activity levels in operative group 58% of braced group had subsequent surgeries due to persisting instabilities

Table 2. Studies related to the use of bracing for rehabilitation postoperatively

Study/Year	Significant Findings
[1]Dai et al. (2012)	<ul style="list-style-type: none"> Bracing of the surgical limb did not decrease asymmetries between limbs Bracing doesn't decrease chances of second ACL injury
[3]Harilainen & Sandelin (2006)	<ul style="list-style-type: none"> No difference in activity level, laxity or strength between braced and non braced groups at 2 and 5 years postoperatively
[4]Hiemstra et al. (2009)	<ul style="list-style-type: none"> No difference in pain levels, ROM, medication use and effusion between braced and non braced group at 2 and 14 days postoperatively
[5]Holm et al. (1999)	<ul style="list-style-type: none"> Compliance with brace use can be an issue No difference between groups in the knee joint laxity, muscle strength, pain between braced and non braced groups Cincinnati knee score improved in brace group after 3 months Thigh atrophy increased and muscle strength decreased in braced group Bracing did not reduce risk of further injury
[10]Möller et al. (2001)	<ul style="list-style-type: none"> No difference in knee laxity, muscle performance, ROM, activity levels between braced and non braced groups at 2 and 6 weeks and 3, 6 and 24 months postoperatively Non braced group showed increased Tegner score after 6 months

Conclusions

The literature supported the hypothesis:

- Using bracing as a conservative form of treatment:
 - Use of bracing reduces mechanical load on the knee very minimally and does not reduce anterior tibial translation
 - Higher risk for meniscal pathology
 - Return to play is greatly decreased and re-injury is common
- Using bracing postoperatively:
 - No differences in braced and nonbraced groups in pain levels, medication use, ROM, knee laxity and activity levels
 - Some evidence for subjective measures of stability
 - Thigh atrophy can occur due to knee bracing
 - Does not reduce risk of re-injury
- Other conclusions
 - Conservative forms of treatment for ACL injuries are unsuccessful and surgery should be the main treatment method in all patient populations
 - Children wearing braces could be at similar risks as children not wearing braces without knowing it
 - Further studies need to be done on the topic

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