Prophylactic knee braces for football: Do they work?

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Epidemiologic studies regarding the efficacy of prophylactic knee braces must take into consideration many variables. The ideal study should be randomized and prospective. Controls should be simultaneous rather than historical. Was the diagnosis established by a trainer and confirmed by a physician? Rule changes may negatively impact injury frequency/severity. What role did playing surface have on injuries? Shoe wear could be a factor, as some authors have noted increased of foot and ankle injuries. How was an injury defined or classified? Were thigh, lower leg, or foot and ankle injuries assessed? Did the study critically assess a difference in injury frequency and/or severity as it pertained to medial collateral ligament injuries, anterior cruciate ligament injuries, meniscal injuries or combined injuries? Was time missed defined (practice/week/game)? When studying the prophylactic brace literature currently available, one must ask these questions to critically determine the strength and deficiencies of the study.

Nowalski studied 20 patients who had anteroposterior radiographs of the knee with and without 40 pounds of valgus stress applied below the knee. A second radiograph was obtained with the patient wearing a variety of lateral-sided prophylactic braces, hinged in the middle and offset from the knee. Less medial gaping of the braced knee was noted. This was the first published study evaluating prophylactic braces to protect from lateral applied knee forces.

The Anderson Knee Stabler Brace was developed in 1978 by George Anderson, head trainer of the Oakland Raiders, to protect medial collateral ligaments from re-injury. Anderson's colleagues in the professional and college ranks were impressed with the reports of its effectiveness and began using it on their athletes who had sustained medial collateral ligament injuries. Subsequently, the medical staff of several teams decided that the brace could more importantly be used prophylactically. As the word about the potential to protect the medial collateral ligament spread, some were not careful to discern between medial collateral ligament and total knee protection. Considerable controversy remains on how effective these braces are in preventing such injuries.

Hewson et al.6 Rovere et al, Paulos et al8 and Teitz et al15 have reported epidemiologic studies that have been nonsupportive in substantiating decreased incidence of medial collateral ligament and/or anterior cruciate ligament injuries when prophylactic knee braces are used (Table).

A medical record review was presented by Hewson et al6 concerning the University of Arizona intercollegiate football teams over an eight-year period (1977-1985). The nonbraced period was reviewed from 1977 to 1981. Following this, the Anderson Knee Stabler was mandatory for all practices and games for players at greatest risk, including linemen, linebackers, and tight ends, from 1981 to 1985. Results showed that the number, type and severity of knee injuries were similar for the braced and nonbraced groups.

Rovere et al performed a two-year study including all players on the Wake Forest Football team using the Anderson Knee Stabler prophylactically during practice and games.11 A two-year nonbrace control period (two years prior) was also evaluated.
Grade I medial collateral ligament sprains accounted for 67% of injuries in the nonbrace period and 62% of the injuries in the brace period. During both periods, offensive team members, especially linemen, had the most knee injuries, and defensive backs the fewest. Brace use did not significantly alter the relative frequency of injuries by player or position. This study concluded that the Anderson Knee Stabler was ineffective for prophylaxis. Knee injuries were more common when braces were worn. Since brace wear was also associated with leg cramping and added financial expenditures, the authors concluded that they could not recommend the use of a prophylactic knee brace without further study.

Teitz et al used the members of Division I of the National Collegiate Athletic Association (NCAA) as its study population. Their results showed that in 1984 and 1985, players who wore prophylactic knee braces had a significantly higher injury rate than unbraced players. Player position, playing surface, mechanism of injury, or type of brace did not affect the rates of injury.

Injuries were more common during contact and at every skill level among those who wore braces. Tietz et al concluded that they would not advise preventive knee bracing among college football players.

Paulos et al, in a biomechanical study using prophylactic knee braces with fresh-frozen cadaveric knees, measured ligament tension and joint displacement at static, nondestructive valgus forces and at low-rated destructive forces. In Part I of their study, no significant protection could be docu-

### Table

**Summary of principal scientific investigation**

**SUPPORTIVE**

<table>
<thead>
<tr>
<th>Name</th>
<th>Summary</th>
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<tbody>
<tr>
<td>Hansen</td>
<td>Four-year USC injury review showed reduction injuries and surgery for braced.</td>
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<tr>
<td>Schriner</td>
<td>Review of 25 Michigan high schools found 5% injury rate for unbraced players and no injuries for braced.</td>
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<tr>
<td>Taft</td>
<td>University of North Carolina study, three years before bracing (no braces) and three years after (100%) braces, showed some injury reduction and significant severity reduction (Grade III down 70%).</td>
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<tr>
<td>Paulos</td>
<td>Braces that increased impact duration protect ACL more than MCL. Most braces provide some degree of protection to the ACL with direct lateral impact.</td>
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<tr>
<td>Sitler</td>
<td>Most highly controlled. Prospective two-year study of 1,396 West Point cadets. Braced defensive players had a significant decrease in number, but not severity, of knee injuries. No difference in foot and ankle injuries.</td>
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**NON-SUPPORTIVE**

<table>
<thead>
<tr>
<th>Name</th>
<th>Summary</th>
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<tbody>
<tr>
<td>Hewson</td>
<td>Reduction in injury frequency and severity at Arizona due to better care, not braces.</td>
</tr>
<tr>
<td>Rovere</td>
<td>Increase in MCL strains and and ACL tears during bracing at Wake Forest.</td>
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<tr>
<td>Teitz</td>
<td>Division I team survey showed braced players had more injuries than non-braced.</td>
</tr>
<tr>
<td>Paulos</td>
<td>Biomechanical testing suggested potential preloading of MCL. Now stated as clinically insignificant.</td>
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<tr>
<td>Bakar</td>
<td>Biomechanical testing showed reduction in abduction angle using functional brace but little or no protection with prophylactic braces.</td>
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<td>Garrick</td>
<td>Evaluated six studies finding significant methodological problems and conflicting results. “Impossible to state with assurance the role of prophylactic knee bracing at this time.”</td>
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<tr>
<td>Grace</td>
<td>Two-year high school study showed four times more knee injuries in the braced group. Dramatic increase in foot and ankle injuries in braced group (3 x).</td>
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</table>
mented with the two preventive
braces used. Also, four poten-
tially adverse effects were noted:
medial collateral ligament pre-
loading, center axis shift, premu-
ture joint line contact and brace
slippage. In part II of their study,
brace-induced medial collateral
ligament pre-load in vivo was
negated by joint compressive
forces. In summary, Paulos et al
810 concluded that most prophy-
lactic knee braces presently avail-
able are biomechanically inade-
equate.

Scientific investigators sup-
porting the use of prophylactic
knee bracing include Hansen et
al,5 involving
players on the
University of
Southern California
football team
from 1980 to
1984. These
authors con-
cluded that pro-
yphylactic knee
bracing was
better than no
bracing in reduc-
ing injuries and
surgery.

The University of North Caro-
lina study was reported by Taft et
al.14 This study documented the
football team’s experience from
1980 through 1982, when no
braces were used, and from 1983
through 1985, when all team
members were required to wear
prophylactic knee braces. These
authors concluded that bracing
was helpful in decreasing the
severity and frequency of knee
injuries.

Schriner et al reported a sur-
vey of 1,246 players from 25 high
schools in Michigan during the
1984 football season.12 Diagnoses
were made by physicians as re-
ported by coaches, and only knee
injuries from lateral forces and
hyperextension were analyzed.
They found a 5% injury rate for
unbraced players and no injuries
for braced players.

Recently, two prospective,
randomized studies evaluated
prophylactic knee braces resulting
in contradictory conclusions.43 Grace et al8 evaluated 580 high
school football players over a two-
year period. The prophylactic
knee braced athletes had a signifi-
cantly higher knee injury rate
(p<0.001) and foot and ankle in-
jury rate (p<0.01). Their results
questioned the efficacy of prophy-

The American Academy of Pediatrics
went even further with its position,
recommending that prophylactic lateral
knee bracing not be considered standard
equipment for football players because of
lack of efficacy and the potential of
actually causing harm.

lactic knee braces and called atten-
tion to their potential adverse
effects on adjacent distal joints.

A study by Sitler et al13 from
West Point noted a decrease in
frequency but not the severity of
knee injuries with prophylactic
brace use. This prospective two-
year study evaluated 1,396 intra-
mural tackle football players with
an average age of 19.3 years.
Seven hundred five controls and
691 braced athletes were involved.
A significant decrease in fre-
quency and total number of me-
dial collateral ligament knee inju-
ries was noted in braced defen-
sive, but not braced offensive,

Medical/Legal Problems

The American Orthopaedic
Society for Sports Medicine and
The Journal of Bone and Joint Sur-
gery (in an editorial, January
1987), have taken the same posi-
tion. The American Academy of
Pediatrics went even further with
its position, recommending that
prophylactic lateral knee bracing
not be considered standard equip-
ment for football players because
of lack of efficacy and the poten-
tial of actually causing harm.

Conclusion
Prophylactic knee braces remain
controversial and, for the most
part, have been shown to be ineffective in preventing knee injuries in collegiate and high school players. Most studies have design flaws and bias, and therefore no conclusions can be drawn at this time. Mandatory prophylactic knee bracing cannot be recommended until further prospective and biomechanical studies can demonstrate otherwise.

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References

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