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Editorial

Editorial: Do Orthopaedic Surgeons Belong on the Sidelines at American Football Games?

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In an earlier editorial, we suggested that orthopaedic surgeons should recommend that children and young adults not play tackle football [7]. We based this recommendation on ample documentation of neurocognitive impairment caused by concussions among youth players [13–15, 17].

At the time, we wondered whether our recommendation went too far. New evidence suggests that perhaps we did not go far enough. Based on a recent study in the *Journal of the American Medical Association* (*JAMA*) [10], which has received extensive coverage in the lay press both in the United States [4, 16] and around the world [5], we now encourage orthopaedic surgeons to ask themselves whether supporting American football at all is consistent with our best professional norms. Our specialty's support for this sport runs deep: orthopaedic surgeons perform preseason physicals on scholastic football players, we cover games from the sidelines all levels of the sport, from youth games to the National Football League (NFL), and orthopaedic departments and practice groups often are thrilled to ink brand-building marketing agreements with collegiate and professional teams. How each surgeon might answer the question of whether all this should continue surely is personal, and well-meaning individuals will disagree. In fact, the senior editorial board here was not completely unanimous on the topic, although it was close. We believe the answer is "no."

The *JAMA* report found that the overwhelming majority of high-level football players in a convenience sample they evaluated had both clinical and pathological evidence of chronic traumatic encephalopathy (CTE) [10]. Longer exposure to the sport in that study seemed to be associated with more-severe symptoms and more-impressive pathological changes in ex-players' brains evaluated at autopsy. We emphasize that these were not incidental findings. Most of these athletes manifested severe signs of mental illness, fully one-third of the patients displayed suicidality (ideation, attempts, or completion), and more than a quarter of the patients with but mild CTE in this series committed suicide.

A key shortcoming of this study—acknowledged by its authors [10, 16] and its critics [1, 3] alike—is selection bias. It seems likely, if not certain, that individuals with symptoms of CTE were motivated to participate in this research, perhaps to get the answer to what must have been a question of existential importance to those players or their families. Because of that, one cannot draw any inferences about the actual likelihood that a football player will develop CTE. In this convenience sample, 91% of college players (48 of 53) and 99% of ex-NFL players (110 of 111) had CTE. If selection bias resulted in a doubling of the actual risk (such that about half of NFL players would develop CTE), no

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doubt that still would remain unacceptable to all physicians. But skeptics may contend that the influence of selection bias is far greater than that. We accept that critique, provided that the skeptics acknowledge that the best-case estimate in support of the safety of football would result in a CTE prevalence estimate of 9%, since only another 1200 ex-NFL players have died since this research group [10] began studying football players' brains. If not a single one of those players had CTE (which seems improbable in the extreme), but the 110 in this series did, the risk of a potentially fatal condition from this occupational exposure—which we should remember, after all, is just a game—would still be too high for us.

Making a professional decision about what sports to support through our participation is complicated for other reasons, as well. Discoveries about CTE didn't begin with football—the condition first was described nearly 100 years ago as "dementia pugilistica" among boxers—and it probably won't end with football, either. Wrestling and ice hockey show up as bit players in the scant research on CTE that is available, and boxing of course is on the list [9]. But because of the combination of the much-higher number of football players exposed at every skill level and age group (boxing does not even make the top-10 list in that regard [11]), the number of orthopaedic surgeons who cover football-related events compared to the much-smaller number who are involved with boxing and other concussion-producing sports, and the dominance of football in terms of CTE risk in all high-quality analyses on the topic that we have found [8, 17], we perceive the problem in that sport merits special attention. We have no particular axe to grind against football, and we are attentive to the research being published about other sports that may eventually be proven to cause as much harm, or more. If compelling data suggest that any of those sports represent a comparably large public-health issue, we will weigh in. On that subject, we suspect and hope that the spotlight will next focus on combat sports. The most-recent minimal suspension periods as advocated by the Association of Ringside Physicians—which include only a 90-day suspension from fighting after two knockouts in a 90-day period [12]—strike us as almost shockingly permissive. We hope to see convincing data on CTE among combat-sports participants in the near future. In the meantime, we feel obliged to deal with the compelling data from the *JAMA* study about American football [10], which are consistent with earlier epidemiological reports [13–17]. The pieces all fit, and they clamor for a response.

So for now, our focus remains on football. We earlier argued [7] that concussion guidelines, decreasing contact in football practice, and better helmets, coaching, and equipment all are good, but they are not sufficient. Current consensus statements and recommendations from important groups recognize serious gaps in our knowledge [2, 6]. Given the known magnitude of the involved harms, and in view of what remains unknown, it seems unrealistic to ask surgeons or their patients to make a fair risk-reward calculation about participation in football. Typically, physicians do not support the continued exposure of patients to known, severe, avoidable harms while approaches to risk-reduction are evaluated. In other spheres of practice, we advise patients to avoid potentially dangerous exposures until they are proven safe.

Athletes certainly have the right to choose what sports they play. And if orthopaedic surgeons were to remove themselves from direct involvement with this harmful sport, most likely the show would still go on. Other health-care professionals might fill in behind us. But if orthopaedic surgeons stopped covering football teams, other physicians might likewise hesitate or withdraw their support, and the result could well be genuine changes at all levels of the sport, and a real reduction in the number of individuals experiencing irreversible brain injury. In any case, any effect orthopaedic surgeons' recusal from football-related activities

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might achieve is perhaps less important than what our professional obligations are, given what we now know about its risks. To restate the obvious, football is only a game. Our first responsibility is the health and safety of our patients. Is it right for us to support a game—through our presence on the sidelines or in the form of marketing and advertising dollars that splash orthopaedic logos on practice jerseys and football stadiums—that causes grave harm to at least 9% of those who play it professionally?

While concussions are not the area of first expertise of most orthopaedic surgeons, our presence on the sidelines helps this sport to continue. In light of the known risks, we suggest that surgeons evaluate whether continuing to support this sport is consonant with the best values of our profession. We believe it is not.

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