Snowboarding injuries

Since the inception of the idea of riding a board on the snow in the 1970s, the popularity of the winter sport of snowboarding has burgeoned. Snowboarding is the only area of the winter sports market that has continued to grow. The 1994–1995 NSAA Kottke National Business Survey indicated that 14% of the 54 million area visits in the United States were generated by snowboarders.\(^1\) It has been reported that 80% of children who participate in snow sports have ridden snowboards by their 12th birthday.\(^2\) Industry analysts project that by the early 2000s more than 40% of those on the slopes will be snowboarders.

With the rise in popularity of snowboarding there has been a change in the injury pattern of these winter sports participants as compared with skiing. There has also been the recognition of an ankle injury that is specific to and only occurs in snowboarding. Along with a number of other medical facilities in Colorado, our clinic participated in a 10 year survey of snowboarding injuries (1988–1999). A total of 7430 snowboarding related injuries were seen in 7051 patients; 74.1% of those injured were male and 25.9% were female. Of the injured snowboarders, 45.2% were beginners, 31.4% intermediate, and 23.4% expert. There were significantly more upper extremity injuries than with skiing, which accounted for 49.1% of all injuries.

Ankle injuries accounted for 12% of all injuries, and fractures of the lateral process of the talus fractures accounted for 3%. Lateral process fractures, or snowboarder's talus fractures, are problematic and continue to be underdiagnosed and under-reported. Any acute and/or persistent anterolateral ankle pain in a snowboarder should be considered a talus fracture until proven otherwise. Most of these fractures are not able to be diagnosed by plain radiographs and require computed tomography imaging for definitive diagnosis. Most snowboarder's talus fractures need operative treatment with excision of fracture fragments or internal fixation of the fractures.

With the continued growth of snowboarding it will be increasingly more important for practitioners to be familiar with the diagnosis and treatment of snowboarding injuries. The studies have resulted in identifying and defining a spectrum of injuries different from those of alpine skiing. Now that the spectrum of snowboarding injuries has been identified, the challenge will not only be the appropriate treatment of such injuries but also education about, research into, and prevention of such injuries. This will not only be the responsibility of the health care provider but also that of manufacturers, ski area owners and developers, snowboard shops, as well as snowboarders themselves.

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“You don’t have to . . .”: walking to a healthier nation

One of the best pieces of public health news in recent years has been that you do not have to be a marathon runner, sports champion, or even regular jogger to derive substantial health benefits through exercise: regular moderate physical activity has cardioprotective and other health benefits.\(^1\) From this and our low levels of exercise as a population, it can reasonably be concluded that promoting regular moderate physical activity—active living—is not only the most feasible route for exercise promotion but also the one that will yield the largest population health gain.\(^2\)

HEBS (the Health Education Board for Scotland) has been something of a pioneer of the active living approach in the United Kingdom.\(^3\)\(^4\) We place a strong emphasis on walking because of its accessibility. Walking is easy for most people to contemplate and do, regardless of age or fitness level. It does not require special skills, expensive equipment, or facilities. It can be built into everyday life—for example, in commuting, shopping, and leisure. And the risk of injury is generally low.\(^5\) HEBs commissioned qualitative research conducted in 1995 supported this notion of accessibility, with preference being shown for walking over swimming or dancing. The same research, however, suggested that walking was not generally viewed as “real” exercise, there being a belief that to be beneficial exercise has to make people sweaty and out of breath. Also, there were negative “non-aspirational” perceptions of walking, including (older) age profile, low status as a form of transport, and a boring image. Further developmental research pointed to the value of giving people “surprising” information about the value of walking.

A few years on, if you ask people what they think of when they hear of “HEBS”, their answer will probably include the name “Gavin”. They are referring to the TV advertising campaign that arose from the developmental research. Paradoxically using a sporting hero to promote regular moderate activity, the advertisement features Gavin Hastings comparing walking a mile with energy equivalent amounts of vigorous exercise. He points out that “you don’t have to” take part in sweaty, frenetic, or very demanding forms of exercise to gain health and fitness benefits; in essence you can walk to good health. In the first phase of running the advert on TV, it was backed up by a special telephone helpline offering a pack containing the HEBS self help guide Hassle free exercise and information on local level physical activity facilities and contacts.

5 HEBS commissioned a pack containing information on local level physical activity facilities and infor-
Role of exercise counselling in health promotion

Despite the clear health benefits that can be attained through adopting a more active lifestyle, most adults in the United Kingdom as well as other industrial nations remain underactive. Faced with this epidemic, there is a growing need for physical activity interventions that can be widely disseminated to all segments of the population across the lifespan.

One promising avenue for physical activity counselling and support lies with the primary care doctor and other health care professionals. The strengths of incorporating physical activity advice and support as part of routine health care include the ability to reach a substantial portion of the population repeatedly over time, the consistency and continuity of message content and delivery, and the willingness among patients to act on their doctor’s advice.1,2 Despite these strengths, however, a number of barriers to physical activity counselling in primary care have been documented, including lack of time, reimbursement, and training in physical activity or behaviour change counselling.3 Although such barriers present continuing challenges to the health promotion and health care fields, the potential public health impact that primary care settings can have on health behaviour change, including physical activity, merits continued investigation.

Although a relatively large body of research exists on advice and counselling by doctors for other health behaviours, such as smoking, relatively little systematic research has been conducted to date on physical activity promotion in primary care. The studies that have been undertaken have taken advantage of a growing body of knowledge, underscoring the utility of applying empirically supported behavioural strategies in facilitating physical activity change. Such behavioural strategies, derived primarily from social cognitive theory and its derivatives, include: identifying specific practical physical activity goals tailored to the patient’s needs and circumstances; structuring initial patient expectations so that they are realistic; identifying those benefits related to becoming more physically active that are most germane to the patient’s own health status; encouraging the patient to keep track of his or her own physical activity patterns through simple self
Where is the pain coming from in tendinopathy? It may be biochemical, not only structural, in origin

Traditional dogma would have it that pain in tendinopathy arises through one of two mechanisms. Firstly, it may result from inflammation in “tendinopathy.” Secondly, it may be due to separation of collagen fibres in more severe forms of tendinopathy. The latter situation parallels the mechanism of pain with collagen separation after an acute grade I or II ligament injury (fig 1).

Despite the wide acceptance of these two classical models of pain production, a number of studies provide data inconsistent with either theory. Consider first the inflammation mechanism. Histopathological examination of surgical specimens from patients with chronic tendon pain are devoid of inflammatory cells. This applies to tissue from the Achilles, patellar, lateral elbow, medial elbow, and rotator cuff tendons. Furthermore, prostaglandin E2 (a marker of the inflammatory process) is no more abundant in patients with Achilles tendon pain than in normal controls.

monitoring tools; and providing continual interest, encouragement, and support for physical activity. Some of these behavioural strategies have been used in studies in which primary care doctors have been trained to deliver brief advice and counselling on physical activity, with encouraging results in the short term. In one study, for example, a written goal oriented exercise prescription from general practitioners, in addition to verbal advice, was particularly effective in promoting increased physical activity over a six week period. More discrepant results obtained from longer term multiple risk factor programmes, however, suggest that more intensive interventions may be needed to obtain longer term effects in at least some segments of the population. Such interventions could include the use of health educators and professionals in addition to the doctor. Health educators and other allied health professionals can provide a level of advice and counselling beyond that which doctors, constrained by time and similar barriers, are typically able to deliver. One promising approach awaiting more extensive investigation involves using brief advice from the doctor as a means of setting the stage for physical activity change in conjunction with specific referral to other health care based or community based health educators or providers. In this way, the perceived credibility and authority of the doctor can be harnessed as a catalyst for change, while the very real time constraints facing many doctors are recognised. The challenge remains to structure the referral network effectively such that patients will successfully follow through with the referral. To maximise the potential benefits of this type of referral network, continuing communication between the doctor and referral source is essential.

In addition, the studies targeting primary care providers have focused almost exclusively on doctors involved in family practice and internal medicine. Yet, other primary care specialties, such as paediatrics and obstetrics-gynaecology, reach important segments of the population for whom physical activity information and messages are particularly relevant. Future research should target the full range of primary care practice.

While face to face instruction and counselling for physical activity have traditionally been the norm in most countries, a growing scientific literature has underscored the utility of mediated channels for delivering physical activity advice and information in an efficient, effective, and potentially less costly fashion. For instance, in the United States, at least 13 randomised controlled investigations have systematically evaluated the use of telephone based physical activity advice and support, either in conjunction with or independent of advice from the doctor. The telephone supervised physical activity approach has been shown to be effective in both older and younger adult populations, women as well as men, cardiac patients, older family carers of relatives with dementia, and overweight patients. It has been found to be effective in promoting physical activity of various types—for example, endurance, strength, flexibility, general conditioning—intensities—for example, moderate intensity exercise, more vigorous exercise—and formats—for example, home based, group based, combinations of home based and group based exercise. Telephone and similar mediated approaches allow both the health professional and the patient a level of convenience and flexibility that is often diminished or lacking in group based physical activity regimens.

In summary, to reach the public health goals on physical activity in the United Kingdom, United States, Australia, and other countries, continued efforts to involve primary care providers and other health professionals as active facilitators of the physical activity message are strongly indicated. Primary care advice in conjunction with referral to appropriate community organisations may help to facilitate the long term increases in physical activity participation that are critical for health promotion and disease prevention. Telephone and other mediated approaches to physical activity promotion provide a promising avenue for programme delivery, in primary care as well as other community settings.

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Unfortunately, the collagen separation theory does not hold up under scrutiny either. The following five observations about pain and collagen in the patellar tendon are inexplicable. (a) Patients who have patellar tendon allograft anterior cruciate ligament reconstruction have minimal donor site knee pain, yet collagen has been excised. (b) Such patients are generally pain-free (and back at sport) despite the persistence of abnormal collagen for two or more years.\(^1\)\(^4\) (c) Similarly, after open surgery for jumper's knee, the imaging appearance of the tendon—that is, collagen status—does not correlate consistently with knee pain.\(^5\) (d) Patients with jumper's knee can also be treated by an arthroscopic debridement of the infrapatellar fat pad and the posterior border of the patellar tendon without operation on the collagen defect in the tendon itself.\(^6\) (e) Large, asymptomatic ultrasonographic hypoechoic regions (abnormal collagen) can be found in patellar tendons of some athletes who have never had a history of jumper's knee.\(^7\)\(^8\)

Such discrepancy between collagen structure and pain is not confined to the patellar tendon. Patients with partial (non-perforated) rotator cuff tears were found to have more pain than those with complete perforations\(^9\) despite the former having less collagen damage. Clearly there is more to tendon pain than discontinuity of collagen per se.

Nociceptors provide significant afferent pain pathways. In the knee, they are located in the retinaculum, fat pad, synovium, and periosteum\(^1\)\(^0\) and all these structures may play a role in the tendon pain pathway. Biochemical irritants may include extravasation of glycosamines, especially chondroitin sulphate,\(^1\)\(^1\)\(^1\)\(^2\) from damaged tendon.

The five observations listed above can be explained with what we term a “biochemical” hypothesis (fig 2). We speculate that the pain of patellar tendinopathy is largely due to biochemical agents irritating nociceptors located in the fat pad immediately posterior to the patellar tendon. In 39 cadaver dissections of the proximal patellar tendon,\(^1\)\(^3\) we consistently identified a thin layer of fat adherent to the posterior portion of the patellar tendon. In the corresponding tissue specimens from patients operated on for chronic jumper's knee, this fat tissue contained increased Alcian blue stain (and thus glycosaminoglycans), presumably leaked from the adjacent region of tendinosis.

Alfredson recently identified an abnormal amount of the excitatory neurotransmitter, glutamate, in subjects with painful Achilles tendinopathy.\(^3\) Until these histopathological and biochemical findings are correlated with some measure of pain, we can only speculate as to whether they are causative, or merely byproducts of nearby tendinosis.

Of interest, in the rotator cuff pain and pathology study quoted above,\(^4\) collagen damage was inversely related to pain, but the presence of substance P (a nociceptive neurotransmitter) was significantly associated with pain. Nerve fibres immunoreactive to substance P were localised around vessels in the subacromial bursa and in the non-perforated rotator cuff.

Although the data presented may suggest a biochemical cause of pain, other workers consider mechanical impingement of the fat pad as a cause of anterior knee pain. The Australian physiotherapist, Jenny McConnell, recognised fat pad impingement as a cause of anterior knee pain (not necessarily tendon pain) over 10 years ago. Johnson proposed that impingement caused the pain of patellar tendinopathy.\(^4\) The infrapatellar fat pad is an extremely sensitive region\(^1\)\(^5\) and contains a large number of nociceptors, but as tendon pain occurs at many anatomical sites, it does not appear logical that a structure related to only one tendon—that is, the patellar fat pad—would necessarily play a unique role in a problem as widespread as tendinopathy. Further, the clinical observation that the pain of jumper's knee does not disappear and may actually increase when palpation is performed with the knee in full extension would appear to argue more for a biochemical than a mechanical cause of pain in tendinopathy. Nevertheless, the jury requires more evidence.

If our biochemical hypothesis proves to have some validity, it would have significant clinical and research implications. In clinical management, the aim of treatment would be to modify the biochemical milieu, rather than to focus on reducing inflammation or necessarily augmenting collagen repair. Collagen repair may, of course, improve the biochemical milieu and thus explain why eccentric strengthening programmes can help.\(^1\)\(^6\) Researchers would be encouraged to pursue a pharmaceutical approach focused on reducing the irritant (but not necessarily inflammatory) biochemical compounds around the tendon. Surgery may play a role through denervation. Thus, if sports medicine researchers collaborate with basic scientists who understand pain physiology, knowledge will be...
advanced in both fields, and we will progress toward the goal of alleviating the pain of what is often regarded rather a trivial problem.

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\( \dot{V}_O_2 \) slow component and performance in endurance sports

For almost 80 years, physiological studies have attempted to explain endurance performance and to develop ways of improving it by training. Performance for a runner can be represented by the relation of his/her personal power (velocity) to time in exhaustion (time limit).1

There are particular velocities that delineate intensity domains which are defined by oxygen uptake (\( \dot{V}_O_2 \)) and blood lactate response versus time.2 3 We are going to use them to define the slow phase of \( \dot{V}_O_2 \) kinetics \( \dot{V}_O_2 \) slow component) which only appears during intense exercise.

A high range of work can be identified at which there is a sustained increase in blood lactate and a decrease in arterial pH with time. These responses decline back towards a baseline value. Oxygen uptake increases in a hyperbolic relation between power (velocity) and time.6 "Critical power" which is the vertical asymptote of the hyperbolic relation between power (velocity) and time, is the time limit at the critical velocity, during high intensity exercise, neither \( \dot{V}_O_2 \) nor blood lactate can be stabilised, and both rise inexorably until fatigue ensues, at which point \( \dot{V}_O_2 \) reaches its maximum value.9

The initial very small component (phase 1), resulting from a sudden change in the venous return in combination with a small change in the mixed venous gas tension, is not fitted into the following equation. In fact, the parameters for the oxygen uptake kinetics were obtained from a two component exponential model in which the first component accounted for the fast component (phase 2) and the second component accounted for the slow component (phase 3). The oxygen uptake kinetics are described as a function of time by the following equation:2 5 \( \dot{V}_O_2 (t) = A_o (baseline) + A_1 \left( 1-e^{-\frac{t}{\tau_1}} \right) \) (fast component) + \( A_2 \left( 1-e^{-\frac{t}{\tau_2}} \right) \) (slow component) where \( A_o \) is the resting baseline value, \( A_1 \) and \( A_2 \) are the amplitudes for the two components, \( \tau_1 \) and \( \tau_2 \) are the time constants for the two components, and TD, and TD, are the time delays from the onset of exercise for the two components.

\[ V_O_2 \text{ slow component} \]
Hence, the so-called VO2 slow component is the second amplitude (\(A_2\)) of the increase in VO2 that appears at TD. This second amplitude represents about 10% of the first (\(A_1\)) and depends on the absolute intensity of exercise because VO2 is regulated by the split of ATP and phosphocreatine.11 The value of the VO2 slow component can reach 500 ml/min and is generally considered to be significant when the value is above 200 ml/min. To avoid the use of this complicated equation which necessitates the use of software such as Sigma plot (SPSS), the VO2 slow component can be identified as described initially by Whipp and Wasserman12 by calculating the difference in VO2 measurement between the 6th and 3rd minute or, if the exercise is performed until exhaustion, between the third and last minute.13

The appearance of this slow VO2 component is mainly due to the recruitment of fast fibre type II fibres with fatigue.14 It has been shown that type II fibres have a slow VO2 component means that they spend longer sustaining VO2 at V\(\text{O}_2\)max than at 100% \(v\text{V}_2\) in the long term. The longest time at V\(\text{O}_2\)max is at a lower percentage of V\(\text{O}_2\) max and the total distance-time.26 This relation between VO2max and velocity can be used to determine the velocity that elicits the longest time to exhaustion at VO2max.27 This velocity is not significantly different from VO2max determined from an incremental protocol, but is significantly higher than the critical velocity classically determined using a two parameter critical power model and the total distance-time.10

The existence of this VO2 slow component phenomenon raises the question of how athletes can adapt their training to improve performance. In fit runners, who are not at a high level (V\(\text{O}_2\)max = 19 km/h), eight weeks of training at high intensity was shown to remove the VO2 slow component at the same absolute velocity (V Billat, A Demarle, J Slawinski and JP Koralsztein, unpublished work). This was because VO2max increased, and at the same velocity was at a lower percentage of VO2max than before training. The time limit at this previously high intensity training was (20 v 10 minutes). At the same relative velocity to VO2max, the VO2 slow component was comparable with that before training, which means that this high intensity training (twice a week) has to be calibrated at least every two months in this case.

In conclusion, the VO2 slow component phenomenon, which was first described by Margaria et al in the sixties28 and then by Whipp and Wasserman in the seventies,29 has been widely focused on in the nineties. In the light of this, it should be possible in the next five years to use the knowledge to diversify training and to explore endurance training effects and fitness.

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Should nasal fractures be treated on the spot?

We all know the scenario at the side of the rugby pitch, as the team attendant or doctor yanks a nose straight before any pain is perceived by a front row “beauty” who then returns to play. But should nasal fractures be treated in this way, on the spot?

Would sports medicine doctors let their own broken noses be treated on the spot?

“Yes, I’d have it put back pitch side—once I’ve retaliated and before the pain starts.”

“Depends who by.”

“Yes I’d like it put back immediately . . . but I’ve had my nose put back on the field several times and then had to have a surgeon sort it all out later, but that’s OK.” (Personal discussions at the BASM 1999 conference)

What are the dangers of this procedure?

If looks are spoilt, an athlete may be persuaded to sue who ever tampered with their nose and make the culprit pay for their own broken noses be treated on the spot?

Some questions before letting the doc sort the nose

Is the heat and pressure of the sports field the place to be deciding the severity of the fracture even if you are a doctor?

How much ENT training has the average sports doctor had?

Would an ENT surgeon reduce a fracture pitch side?

Would an ENT surgeon be happy for doctors, physiotherapists, or first aiders to reduce a nasal fracture “on the spot”?

ENT surgeons’ opinions varied among those I contacted.

“Allowing a GP colleague, if experienced, or ENT surgeon to put their nose back pitch side. But not a ‘bag man’ pitch side or a casualty SHO (even after an x ray) to do the same procedure.”

The Defence Unions referred to the Bolam Defence of “accepted practice” for a sports doctor. “If a member were to treat a displaced nasal fracture on the spot, and there was an unsatisfactory outcome, it may well be alleged that it was negligent to undertake such a procedure. In defending a member we would need to take into account the training and experience of the member and an independent expert opinion from a practitioner in the same speciality.” (Personal correspondence with The St Paul International Insurance Agency).

“Advocates of an on the spot treatment of nasal fractures would have to show good supporting evidence that the outcome is at least as good, if not improved, by undertaking urgent reduction, rather than waiting for ENT specialist care a few days after the injury.” (Personal correspondence with the Medical Defence Union).

In conclusion, I think that until “What is accepted practice for sports medicine doctors” is tested in a court of law, we are still left with no straight answer to the question. My search for what is accepted practice for “on the spot” treatment of nasal fractures proved fruitless!