Sport Health

Incorporating The Bulletin

SPORTS MEDICINE AUSTRALIA

Publisher
Sports Medicine Australia
PO Box 237 Dickson ACT 2602
Tel: (02) 6230 4650
Fax: (02) 6230 5908
Email: smanat@sma.org.au
Web: www.sma.org.au

Circulation: 5000
ISSN No. 1032-5662

Editors
John Orchard
Kerry Mummery

Managing Editor
Dominic Nagle

Chief Executive Officer
Gary Moorhead

Subscription Manager
Joyce McClune

Advertising Manager
Nathan Kruger

Design/Typesetting

Levitate Graphic Design – www.levitategd.com.au

SMA STATE BRANCHES

ACT
ACT Sports House
100 Maitland St Hackett ACT 2602
Tel: (02) 6247 5115

New South Wales
PO Box 724, Glebe NSW 2037
Tel: (02) 9660 4333

Northern Territory
PO Box 2331, Darwin NT 0801
Tel: (08) 8981 5362

Queensland
Sports House, 150 Caxton St, Milton QLD 4064
Tel: (07) 3367 2700

South Australia
PO Box 219, Brooklyn Park SA 5025
Tel: (08) 8234 6369

Victoria and Tasmania
1st Floor, 120 Jolimont Rd, Jolimont VIC 3002
Tel: (03) 9654 7733

Western Australia
PO Box 57, Claremont WA 6010
Tel: (08) 9285 8033

SUBSCRIPTION RATES 2003

Australia A$35
Overseas A$50

SMA members receive Sport Health as part of their membership fee

Single copies and back copies A$15 (includes-postage)

PP No. 226480/00028

For subscriptions contact Joyce McClune
Phone: (02) 6230 4650
Email: smanat@sma.org.au

Contents

Cover photograph: Sebastian Costanzo/fairfaxphotos

Steps in the right direction

By Gary Moorhead

To remain faithful to the Sports Medicine Australia Mission Statement and continue to be the "peak authority on medical and health care of active persons at all levels", it is necessary for SMA to be proactive and adapt to changing circumstances.

At its last meeting, the SMA National Board took decisions to ensure that SMA continues to discharge this mission. These decisions were, firstly, to build a closer relationship with Fitness Australia and, secondly, to enlarge SMA's professional membership by admitting osteopaths as full professional members.

SMA was established following a meeting of medical practitioners in early 1956. These medical practitioners were concerned about the standards of athlete care likely to be offered at the Melbourne Olympics scheduled for later that year. While, initially, membership was composed of medical practitioners, there was always a recognition that the organisation would be strengthened by an ability to draw on the skill, knowledge and experience of other health and scientific disciplines. This respect for multidisciplinary input led the organisation to withdraw from a formal association with the Australian Medical Association (AMA) very soon after its creation, (the AMA demanding that affiliated organisations be composed primarily of medical practitioners).

Currently SMA's professional membership is composed of members of most medical and allied health professions; the science of their practice is supported by a large contingent of sport- and physical activity-based scientists. As science and practice increases knowledge and professionalism, the professional status of occupations rises accordingly. The capacity of sports medicine in Australia to take advantage of new knowledge has been one of its strengths.

However, the induction of new professions has not always been straightforward. A Board member from the early years of the Federation provided an amusing recollection of a Board meeting where there was serious concern expressed at the proposal to admit as full members practitioners of "this therapy called physio!". Stripped of superficialities, concerns about admitting new types of members are usually based on two significant fears: will they lower standards of practice and care? will they steal some of my business?

Osteopathy is a conventional medical science primarily focused on disorders of the musculoskeletal system. Osteopathic practitioners undertake five years of full time tertiary study and clinical training. Osteopaths are registered by all state and territory health departments and recognised by all major health funds and government bodies including Workcover, motor accident authorities and the Department of Veterans' Affairs[1]. Osteopaths are primary health care practitioners and work as independent practitioners and as members of multidisciplinary health care teams. (More information about osteopathy can be found on the website of the Australian Osteopathic Association (AOA) at www.osteopathic.com.au.

The main impetus for the admission of osteopaths as full members of SMA came from SMA members, primarily physiotherapists, who had worked with osteopaths or employed osteopathic-based techniques. Once the approach had been made to the SMA National Board (in July 2005), the Board embarked on a process of consultation with all SMA Discipline Groups to determine the Disciplines' attitudes to the proposal and to seek responses from the AOA to concerns raised. These concerns being satisfied, the Board proceeded to invite osteopaths to join SMA as full members.

There are approximately 1000 osteopaths currently practising in Australia. Sports medicine is a growing interest within osteopathy and this fact coupled with a strong policy of mandatory professional development for AOA members makes SMA's multidisciplinary educational programs of particular interest.

A closer relationship with the fitness industry presents different challenges and opportunities.

There are approximately 12,000 registered fitness professionals in Australia, working privately or in fitness centres as fitness leaders, aerobic instructors, gym instructors or personal trainers. Fitness Australia, the industry peak body, represents both fitness professionals and fitness centres.

Fitness Australia has embarked on a policy of strengthening its alignment with the health sector. A closer relationship with SMA is part of that policy[2]

For many years, the relationship between many SMA members and the fitness industry was clouded by suspicion. While SMA, the Australian Association of Exercise and Sports Science (AAESS) and the Australian Council of Health, Recreation and Physical Education (ACHPER) have

» *Continued on page 6*

Evidence-based medicine and ACL reconstructions

By Dr J

I was lucky enough to have an extended overseas trip over summer during which I attended my first North American conference in more than five years. I'm very privileged to look after the NSW State of Origin rugby league team currently, but it means that I miss the ACSM annual conference, and I really do miss it, if you know what I mean. Last year I missed the Roald Bahr Oslo extravaganza on injury prevention, again with a fair tinge of regret. So it was great to have a week of skiing this January in Colorado (at a conference organised by Ohio State University (OSU)[1]) and get reminded how impressively the Yanks deliver their material at a conference presentation.

One of the highlight presentations was Kurt Spindler, an orthopaedic surgeon from Vanderbilt University, on "evidence-based medicine". This is a trendy topic and it was great to see a surgeon be such a disciple of this movement (given that surgeons are renowned for preferring clinical experience to scientific proof). I got the impression that Spindler really wouldn't ever do a knee arthroscopy on a degenerative knee without a meniscal tear, because the best available evidence suggests it wouldn't help the patient.

Of course, we all know that, in the real world, despite knowing that the evidence doesn't support the procedure, many orthopaedic surgeons will convince themselves -- and more importantly the patient with knee pain from a degenerative knee sitting in the waiting room -- that an arthroscopy is worth doing. "In my experience, there have been patients with knees just like yours who an arthroscopy has helped", is how the sell runs. Of course there have been plenty who have got worse (which most surgeons now reveal as part of their informed consent) but, hey, if that happens we can always fix you up properly with a knee replacement!

There was another good presentation at the OSU conference by Chris Kaeding on stress fracture management, where he pointed out, correctly, that many stress fractures are quite rare and that we therefore do not have any level I evidence (randomised control trials) on which to base our management; therefore the level IV case series and level V experiences are still important.

After Spindler's presentations I was even more convinced that, when you have good quality level I evidence, you need to make alterations to your clinical practice to follow this evidence. However, there is still a lot of debate over what is needed to satisfy the criterion of good quality level I evidence, and I'm not so sure that a bad quality level III study is more important than a good dose of level V experience.

In Spindler's presentation he gave a few analogies: eg, "We can classify wine by quality, so why can't we do the same thing for scientific evidence?", he asked. A problem with this analogy, for me, was that he had a photo of a cheap Marlborough Sauvignon Blanc as an example of a level V wine and personally I probably would have enjoyed this drop more than every other white wine he used in the analogy, apart perhaps from the Premier Cru Burgundy that was his level I white example.

Spindler discussed evidence-based ACL management in both his presentation and privately over dinner with me, and the take home messages were that (1) for young active patients there is increasing evidence that early ACL reconstruction is worth doing to prevent later meniscal damage and (2) in summary, there are minimal differences in outcome between patellar tendon and hamstring tendon reconstructions. Spindler has written up a meta-analysis of RCTs between patella tendon or bone-patella tendon-bone (BTB) ACL reconstruction compared to multi-strand hamstring tendon (HS) reconstruction (published recently in the AJSM) and concludes that the results of the vast majority of trials show equivalent outcomes.

I read recently that the HS ACL reconstruction should now join the BTB one as a "double gold standard" by which to judge reconstruction results, and I think that this is a fair call. I wouldn't raise my eyebrows if I heard that a friend was getting either of these operations, in the same way that I might if I heard that a synthetic graft was being used. Spindler therefore concludes that surgeons should generally go with whichever of the two techniques they are most comfortable with (in terms of ease of procedure, training etc). I think this is a fair conclusion based on the best available level I evidence, and I don't think it is bad advice.

Moving on from Spindler's conclusions, I hope you want to know how I advise my own patients in the real world and on what basis I do this. Continuing along the road of the level I studies, if you read through the fine print, there are differences in outcomes between BTB and HS procedures, even though the final scores don't significantly differ. Beyond any shadow of doubt,

there is a pretty much universal trend for BTB reconstructions to lead to slightly superior stability ratings (eg, lower side to side differences on the Lachman test) but for HS reconstructions to lead to slightly superior morbidity ratings (eg, less kneeling pain, fewer extension deficits). Spindler's message is that, because these two factors just about cancel each other out in the overall scores, there is no evidence-based reason to prefer one type of reconstruction to another, just as there is no reason to prefer sauvignon blanc to chardonnay.

I'd like now to switch tack and make a level V comparison between the reconstructions of two of Australia's most well-renowned knee surgeons, Merv Cross and Leo Pinczewski. They happen to work at the same practice, which does make comparisons a little easier (and, for that matter, their rivalry a little stronger).

I immediately need to declare a bias in that I've done a regular assist list with Merv for the last 10 years or so, and that in the past I've assisted Leo and helped him construct the database which he uses to keep track of his research patient follow-ups. And I would say to anyone, including myself in the mirror, that those who do not believe that surgical-assisting earnings can cloud the view about surgical outcomes are kidding themselves. One of Leo's favourite sayings is "nothing ruins surgical results more than good follow-up", which is another way of saying that, in clinical practice alone, a surgeon and a surgical assistant are going to see a lot more of the good results in the future than the bad results (who will tend to go elsewhere).

BTW, in the Sydney orthopaedic world both Merv and Leo have reached the iconic status of famous rock-stars like Madonna, Bono, Cher etc. who generally get referred to only by their first name. I apologise if it comes across as pandering, but comparing the reconstructions of Merv and Leo is a bit like comparing the golf games of Jack Nicklaus and Tiger Woods. These golfers have different strengths, they don't always win, but they are the part of the cream of the crop.

In saying this, I don't want to imply (because I shouldn't) that the quality of Merv and Leo's work is a cut above the other knee surgeons in Sydney (or, gulp, Melbourne) but it is a fair call to say that their famous status probably is. Merv's fame in knees has arisen through being one of the first orthopods in Australia to subspecialise completely to a particular joint (in the early 80s) and through his association with rugby league, which Eddie (another known by his first name) is now finding is the sport which makes Australia's biggest city tick. Leo's fame has come through becoming the highest turnover ACL reconstruction surgeon in the world (as he will no doubt tell you if you ever ask) and having the most comprehensive patient follow-up database for ACL reconstructions in the world.

Now an interesting thing between Merv and Leo is that with respect to ACL recos, Merv has the reputation as a devout patella (BTB) man and Leo has the reputation as a devout hamstring (HS) man. Merv doesn't have a problem with Leo being Jewish and Leo doesn't have a problem with Merv being Catholic; just don't get them started on ACL technique! I would contend that their "religions", as far as ACL recos go, run much deeper than simply BTB versus HS.

I would characterise Merv as a "stability" disciple and Leo as a "low morbidity" disciple. That is to say, Merv is devoted to an ACL technique across the board which maximises stability, whereas Leo is devoted to an ACL technique across the board which minimises morbidity. In addition to preferring BTB grafts, Merv likes to do acute reconstructions the week of the ACL injury, likes to put the knee in a brace for a few weeks and likes the patient to wait a bit before jumping back into active physio. Leo, on the other hand, not only prefers HS grafts, but likes to wait a few weeks before performing the reco itself (until the acute swelling has gone down). After the operation has been done though, Leo encourages mobilisation as quickly as the patient can tolerate it.

When you combine the differences between technique and philosophy, you get knees which have subtle but consistent differences in their characteristic outcomes. The vast majority of both both Merv and Leo post-ACL reco knees are functionally stable and with their owners (ie, their patients) happy with the final outcome. However, when you examine a bundle of Merv and Leo knees they start to feel "different" as consistent patterns emerge.

Almost all of Merv's ACLs feel as "solid as a rock" with the Lachman test virtually identical to the other side. If you start getting picky with the outcomes, you also notice that a small proportion of Merv's knees don't quite have the full 180 degrees of extension. With Leo's ACLs, you feel as if virtually all of them have a great range of motion, lack of effusion and lack of quads wasting. And then if you feel a few more and start to get critical, you think that the odd knee has a Lachman test with more play than the contralateral side. Of course, even the "slightly tight" Merv knees and "slightly loose" Leo knees are generally well tolerated by the patient, which is a reason why these two surgeons are so popular for ACL reconstructions.

Remember that, with all of the above perceived differences I am documenting, the evidence as to whether they exist is level V only, because a comparative trial hasn't been done. If you doubt the above observations, though, ask any of the physios or sports physicians at North Sydney whether they strongly disagree and I'll bet you a beer that they won't.

If you are convinced that the differences between a Merv knee and a Leo knee are real and consistent, you can start to play horses for courses with the patient selection in terms of who you might recommend referring to either of them. The interesting thing is that preferred patient selection, in my opinion, pretty much matches up with how

these two surgeons built up their practices in the first place.

Merv is an ex-rugby league player, and he pretty much wants to give you the knee that will allow you to return to football (or any other sport) for the rest of your sporting career, if that's what you desire. One of Merv's favourite sayings is "treat the primary presenting complaint of the patient" which in the case of an ACL injury is usually instability. Yes, anterior knee pain does exist but, in Merv's eyes (and I'm quite sure he is correct), the number one reason for not being able to play football after an ACL reco is that your knee is still unstable. NRL players who tear their ACL are happy to use Merv for the reco, because they know of plenty of other players whom Merv has done and who got back to their former level, so they are happy to stick with someone who has runs on the board. Private patients who don't play NRL-level rugby league are also more than happy to use Merv, knowing that he has returned so many top athletes to their sport, in the thought that if he can make the operation work for a big name NRL player, then he'll get it right for them.

Leo's rationale works along slightly different lines or the premise that you should be doing anything for the patient that is likely to improve their satisfaction at follow-up. What patients want from their operation at the time of the acute injury (which is to have the knee back to how it was before) is slightly but subtly different to what they might want one or two or five years down the track. Straight after the injury, if you put it in terms of "which would you rate as the most important characteristic of the operation, one which gives you the most stable knee or one which gives you the most comfortable knee?" many football or basketball or netball players might opt for greater stability. One or two or especially five years down the track, the so-called football player might now instead be a keen golfer and, if you are a golfer, anterior knee pain is more important than stability. After being through major knee surgery, the desire to play multidirectional sports can quickly wane. In fact, some people believe that it is our duty as clinicians to try to recommend to our non-professional athletes that they wind down their enthusiasm for multidirectional sport after suffering an ACL reconstruction, for fear of developing arthritis.

Leo has an excellent clinical database, which has led to many published papers, comparing the results of his own BTB reconstructions (which he did earlier in his career) and his more recent HS reconstructions. He strongly argues that his results suggest that HS reconstructions are preferable, because of the significantly better morbidity outcomes and because the stats don't reveal any significant differences in the stability outcomes. Bear in mind that, even with a moderately large cohort, it is easier to show statistically significant differences between groups for a characteristic that is common (eg, anterior knee pain) than a characteristic that is more rare (eg, graft rupture).

While his overall study group has longer follow-up than any other comparable one worldwide, it is also worth remembering that it is not a level I (randomised) trial. There are some potential biases that might affect the results. Is Leo a better surgeon at this stage of his career than he was earlier in his career? Is the average person getting referred to him in recent years more sedentary (less likely to want to play high demand sports) than the average person getting referred to him 10 years ago? These sorts of biases are hard to measure but definitely can affect the observed differences between groups.

Other surgeons and sports physicians reading this column would also be very aware that it isn't a comprehensive overview of all of the available procedures to reconstruct an ACL. One common denominator between the Merv and the Leo techniques is that they both use interference screw fixation for the femoral end of the graft. Other fixation devices such as Transfix screws and Endobuttons might give better results for HS reconstructions. I fail to see the logic for using these devices, as a minority of surgeons do, for fixing a BTB graft. Fixation and stability are the big issues with respect to HS grafts whereas avoiding anterior knee pain and regaining full range of movement are the big issues with respect to BTB grafts. If you watched the Winter Olympics, you might want to consider using cadaver grafts, although don't hold your breath waiting for an RCT showing differences in transmission of hepatitis between cadaver grafts and autografts.

I'd also like to caution, even with my biased hat on, against going too far with the strong trend towards HS graft usage that has occurred in Australia over the past decade. According to Spindler's evidence-based recommendations, surgeons should just go with whichever technique they are most comfortable with. This seems to be the HS technique a substantial majority of the time in contemporary Australia.

The HS techniques (and there are a few of them) are generally slightly faster procedures which are relatively easier to perform (you are far less likely to get the graft stuck going into the tunnel if you don't have to worry about a bone block). This is in the background of ACL reconstructive surgery being one of the most difficult techniques in orthopaedics (which is a good reason for wanting a experienced surgeon). In general, HS grafts probably lead to shorter hospital stays and fewer physio visits post-op, so there are lots of practical reasons to prefer them.

However, it is sobering to recall that according to our ACL injury database in the AFL, with medium-term follow-up, 10%-15% of players will re-rupture their graft at some stage down the track. Geoff Verrall, who works in Adelaide and sees many SANFL players (which is where many ex-AFL players go to continue their careers) reckons that this figure would be even higher if we followed up players to the end of their total football career rather than just their AFL career. I would also add that there are quite a few re-ruptures in NRL players that I know of, meaning that the Sydney surgeons collectively may not be doing better than the surgeons in the southern states. If we still are

getting such a high rate of recurrent instabilities in our elite athletes, it means that as doctors we should only discard an operation which has a proven track record for stability (BTB grafts) with a lot of caution.

On that note, later in this edition of Sport Health, the Merv Cross technique for BTB grafts (and its rationale for use) is presented. It doesn't have the same database of follow ups as the Leo Pinczewski operations, so I can't unfortunately give you some crucial stats which you might like to know. Does the Merv technique lead to fewer revision reconstructions than the alternatives? Does it lead to more revision arthroscopic procedures for Cyclops lesions (extension deficits)? Read on and form your own opinions (and importantly also read the Pubmed listed Spindler, Pinczewski and Feller papers which are all essential reading on this topic). My level V experience tells me that the answer to the first question is 'Yes' and my response to the second question is often "Which would you rather?"**SH**

Further reading:

Bartlett RJ, Clatworthy MG, Nguyen TN. Graft selection in reconstruction of the anterior cruciate ligament. J Bone Joint Surg Br 2001 Jul;83(5):625-34.

Brukner PD, Crossley KM, Morris H, Bartold SJ, Elliott B. 5. Recent advances in sports medicine. Med J Aust 2006 Feb 20;184(4):188-93.

Orchard J, Seward H, McGivern J, Hood S. Intrinsic and extrinsic risk factors for anterior cruciate ligament injury in Australian footballers. Am J Sports Med 2001 Mar-Apr;29(2):196-200.

Roe J, Pinczewski LA, Russell VJ, Salmon LJ, Kawamata T, Chew M. A 7-year follow-up of patellar tendon and hamstring tendon grafts for arthroscopic anterior cruciate ligament reconstruction: differences and similarities. Am J Sports Med 2005 Sep;33(9):1337-45.

Spindler KP, Kuhn JE, Freedman KB, Matthews CE, Dittus RS, Harrell FE Jr. Anterior cruciate ligament reconstruction autograft choice: bone-tendon-bone versus hamstring: does it really matter? A systematic review. Am J Sports Med 2004 Dec;32(8):1986-95.

Webster KE, Feller JA, Hameister KA. Bone tunnel enlargement following anterior cruciate ligament reconstruction: a randomised comparison of hamstring and patellar tendon grafts with 2-year follow-up. Knee Surg Sports Traumatol Arthrosc 2001;9(2):86-91.

References

1 Anyone interested in attending a repeat OSU sports medicine/ski conference in Colorado, should they repeat the exercise next January, can express interest by emailing me at johnworchard AT gmail. com (AT means @ but is not quoted directly to avoid spam from robots).

Steps in the right direction

» *Continued from page 2*

had representation on the body that advises appropriate levels of qualification and training for fitness professionals, it is probably true to say that, for many, this representation was seen as a mechanism for ensuring that fitness professionals didn't attempt to practise outside of their areas of expertise.

Indeed, when the Discipline Groups and SMA members represented on various SMA bodies were surveyed for their response to the proposal for a closer relationship with Fitness Australia, many such concerns were raised.

Members cited issues such as:

- fitness centres are only concerned about making money – they have no real interest in the welfare of their clients;
- there is inadequate screening to identify clients who may be at risk and inadequate supervision to prevent injury;
- do fitness professionals understand and respect a hierarchy of expertise?
- fitness professionals may misrepresent themselves as having qualifications equivalent to tertiary trained health professionals; and
- does Fitness Australia recognise the expertise and qualifications of SMA members – especially exercise physiologists? This latter point has been a point of particular frustration, as regulations in some states require tertiary-trained exercise physiologists to acquire additional TAFE-level qualifications before they can be registered to practice as fitness professionals.

To what extent these concerns were real or imagined (and the last is definitely real), the National Board is of the view that SMA must work with Fitness Australia - to resolve these issues and also to work together to provide a higher level of service from both organisations.

Certainly Fitness Australia has shown every indication of supporting such endeavours. Fitness Australia has asked SMA to nominate an SMA-appointed director to the Fitness Australia National Board to take responsibility for medical and health matters. (The SMA National Board has nominated Professor Kevin Norton to this position.) Further, Fitness Australia has indicated that it would like to work towards having the SMA Screening Guidelines adopted by all Fitness Australia members.

In the course of consulting SMA members, it became apparent that, for every member with ingrained suspicions about the fitness industry, there were many other SMA members who had established referral networks with fitness centres and fitness professionals in their local areas.

Resolution of these issues and the development of a closer relationship have much to offer both SMA and Fitness Australia. As statistics on inactivity and its consequent health problems grow more alarming, it is imperative that we take an "all hands to the pumps" approach to the problem.

At last October's National Conference, a paper delivered to the "Exercise Prescription and Delivery - Who Should Do It" symposium dramatically illustrated the importance of adding to the numbers delivering advice to a population of 20 million[3]. Adding 12,000 fitness professionals – especially if they are working in close consultation with health professionals for those in the population needing more expert guidance – is a big step in the right direction. Further, adding a potential referral base of 12,000 may also have some direct positive outcomes for SMA members.**SH**

References

1. Stephen Robbins, Executive Director, Australian Osteopathic Association. Letter to SMA CEO, 28 September 2005.
2. Susan Kingsmill, Fitness Australia's President's Report, January 2006.
3. Professor Wendy Brown, Exercise Prescription and Delivery - Who Should Do It", Symposium, Australian Conference of Science and Medicine in Sport, Melbourne, 13 October 2005.

Letters to the Editors...

I am writing in relation to a paper entitled "*Seasonal and geographical analysis of ACL injury risk in Australia*" that was published in the Summer 2005-06 issue of Sport Health[1].

This paper is topical and addresses an important sports injury issue. Furthermore, to my knowledge, it provides the first analysis and application of relevant data from the Health Insurance Commission (HIC) to highlight an issue of concern to those involved in the prevention, treatment and management of sports injuries.

However, I am concerned that the analysis and resulting discussion of the Australian-based (HIC) data rely heavily on a large number of assumptions which are not adequately justified. Some of these are mentioned briefly by the authors, but then dismissed as not being major confounders and/or evidence justifying them still not given. It may be that these assumptions are valid but, without the authors providing the evidence underlying them, readers are not able to assess the quality of this information for themselves.

It is not my intention to debate the choice of the various assumptions – that is up to the authors – but I do think it worth listing a few of the key assumptions that have been made so that readers of Sport Health can more correctly assess the value of this work. Key assumptions, which are unjustified or stated to various degrees, include:

1. All, or almost all, ACL reconstructions are because of sports injury.
2. Ground/weather conditions are the major aetiological factor for all sports ACL injuries.
3. Football is the major sport leading to these injuries.
4. No reconstruction of sports-related ACL injuries occurs outside the private health system and no reconstructions of work- or traffic-related injuries are treated within the private system.
5. Relating rates of ACL reconstructions across Australian states is directly related to patterns of grass use across states.
6. Age is not a factor in ACL incidence and so does not need to be adjusted for.
7. The different age distributions of population/participants across states do not need adjusting for, and hence age-standardisation of rates is not needed.
8. Any biases introduced by the above assumptions are of the same order of magnitude and direction across states.

I am particularly concerned about the somewhat tenuous links to grass conditions highlighted as major conclusions from the study, when the Australian component of this study design and the associated data sources cannot attempt to answer questions relating to this factor. There is no doubt that this is an area of great importance and topicality, but a different study would need to be undertaken to determine those links.

As a reader of Sport Health, I am left asking the question if there are so "many assumptions and systematic errors within the estimations" (as stated in the middle column, page 22), just how valid are the data and the conclusions drawn from them? If the systematic biases referred to are numerous and/or serious, they would seriously compromise the results from the study. Should a study with so many assumptions in it be published in a forum with the potential to inform sports medicine debate and policy?

Providing a firm, fully-justified evidence base from research such as this is particularly important if sports medicine practitioners or medical/sports policy makers are to make informed decisions. In my view, the ACL article was seriously limited by its lack of discussion of the validity of each of its assumptions and the extent to which these could affect the various rate estimates. Unfortunately, in ignoring these aspects, it failed to provide a good basis for the development of sports safety policy or sports medicine practice.

Prof Caroline Finch

NHMRC Principal Research Fellow
Director, NSW Injury Risk Management Research Centre,
The University of New South Wales

Reference

(1) Orchard J, Chivers I, Aldous D. Seasonal and geographical analysis of ACL injury risk in Australia. Sport Health 2005; 23(4): 20-27.

...and the Editor responds

Dear Caroline

Thanks for your letter and interest in the paper and the topic. I would like to reply with two hats on, initially as a co-author of the paper in question and then as one of the editors of Sport Health.

In referring to the 'study'[1], I will concentrate on the component of

the paper which analyses the rate of cruciate reconstructions on a state-by-state basis, as this is where your criticisms apply. I fully concur that this study is not the tightest ever written from a methodological viewpoint, the major explanation for this being that the authors didn't design the way the HIC groups its Medicare item numbers. However, some definite conclusions can be made from this study and some interesting hypotheses can be generated where the conclusions are a bit fuzzier.

It is pretty undeniable from the data presented that Tasmania has a lower rate of cruciate reconstruction in the private system than Victoria, which itself has a lower rate of cruciate reconstruction than South Australia and Western Australia (Tables 8 and 9). The numbers of operations that were analysed are huge and therefore it is almost certain that chance is not responsible for the observed differences. Given that Medicare is run in the same fashion in all states, it is also very unlikely that there is a data collection bias responsible.

Potential Confounders

It is also undeniable that there are a large number of potential confounders (alternate explanations for the differences observed) other than ground conditions and grass types on football grounds in the various states. Some of these we attempted to assess with the best available alternate data, including age (Tables 3, 4, 8 and 9), sports participation rates (Tables 5, 6 and 9) and rates of private health insurance in the various states (Table 11). There are quite a few others which we currently have no way of assessing, and which we correctly stated (and you have reiterated) have the potential to explain the observed differences between states.

On the other side of the coin, there is a previously published (in the peer-review system) higher ACL injury rate in Western Australia and South Australia than Victoria in the AFL[2,3,4]. The methodologies for these studies are much tighter, involving a single sport, confirmed ACL diagnoses and with known grass types and weather conditions. It seems very likely from these AFL studies that couch (Bermuda) grass leads to higher shoe-surface traction than ryegrass and hence a greater risk of ACL injury[2], although I am aware that some experts have criticised even these studies because of lack of assessment of other confounders such as player boot selection and player fitness during the various months of the year.

I am very excited by the prospect that the 'northern' bias which has been observed in the AFL for ACL injuries (which we believe is related to differing ground conditions) is replicated somewhat in the HIC data set. Of course there are alternate explanations for the HIC observations, but one is that the research findings regarding ground conditions which have been observed in the AFL are just as relevant in the general community. It is quite interesting to note that the 'geographical bias' does not seem to be present for rugby league in Australia or the NFL competition in America, whereas the 'early-season' bias still appears to be present in these other codes. These trends are consistent with our latest understanding of grass types and weather and injury[2].

The criticism made in your point 3 that we don't know that football is the major type of activity leading to cruciate ligament injuries in the Australian HIC data can be countered. It has been well documented that, when they play exactly the same sports, females have a far higher risk of ACL injury than males[5]. However, in every state of Australia the absolute rate of cruciate ligament injury is much higher in males than females (Table 7 in Reference 1). Although there may be other explanations, the only logical one I can think of is that the football codes are responsible for the majority of cruciate ligament injuries in Australian males. All other sports or activities I can think of which may be responsible for cruciate ligament injuries do not have a male participation bias in Australia, which the football codes of course have.

National Register

Both of us know that, if we had a national register of ACL injuries in Australia, which Norway and New Zealand now have, we could repeat this study with much tighter methodology and be much firmer in our conclusions. I hope that the recent Sport Health study adds to the concept that a significant percentage of ACL injuries could perhaps be prevented, which I hope helps us lobby the Federal Government in the future to institute a national register of ACL injuries.

As an editor of Sport Health, I appreciate that your insinuation that the recent ACL paper[1] wasn't up to the standards expected of this publication can be taken as a compliment! It is pretty obvious that Dr. J. sets the bar very high and you need to publish an extremely good scientific study if you don't want to disappoint someone who has just finished reading Dr. J! I also see Sport Health as a great vehicle for the 'not quite up to peer-review standard' but nevertheless stimulating paper.

There are lots of papers out there with interesting data on an interesting topic but with some methodological flaws which might cause reviews in the peer-review system to reject them outright. Despite this, it is my personal belief that some papers which do not adequately assess confounders can sneak through into the peer-review literature with the right reviewers[6,7,8], so even if your study has flaws it can still break through the peer-review system. As was mentioned in the last Dr. J column[9], classic papers have been initially rejected by the peer review system, such as Marshall and Warren's Nobel Prize-winning work on Helicobacter pylori and van Mechelen's sports injury prevention paradigm[10].

Like some editors of other journals, I may be fairly accused of using this one as a vehicle to illustrate my own work. At least in the case of Sport

Health, there is no pretence that I am surreptitiously bypassing the peer-review process by publishing my own work here, or as it so happens rejecting other's work in favour of my own.

In fact I look forward to the day when Sport Health is so full of so many interesting other articles that there is no room to publish my own work!

John Orchard

References

1) Orchard J, Chivers I, Aldous D. Seasonal and geographical analysis of ACL injury risk in Australia. Sport Health 2005 ; 23(4): 20-27, now available at: http://www.injuryupdate.com.au/images/research/ACLgeographySH.pdf
2) Orchard JW, Chivers I, Aldous D, Bennell K, Seward H. Rye grass is associated with fewer non-contact anterior cruciate ligament injuries than bermuda grass. Br J Sports Med 2005, 39(10):704-9
3) Orchard J. The AFL Penetrometer study: work in progress, J Sci Med Sport 2001, 4(2): 220-232
4) Orchard J, Seward H, McGivern J, Hood S. Rainfall, evaporation and the risk of non-contact anterior cruciate ligament injury in the Australian Football League. Med J Aust. 1999;170(7):304-306.
5) Arendt E, Agel J, Dick R. Anterior Cruciate Ligament Injury Patterns Among Collegiate Men and Women. Journal of Athletic Training. 1999;34(2):86-92.
6) Hewett TE, Myer GD, Ford KR, et al. Biomechanical measures of neuromuscular control and valgus loading of the knee predict Anterior Cruciate Ligament Injury risk in female athletes. Am J Sports Med 2005; 33: 492-501.
7) Hewett T, Lindenfeld TN, Riccobene JV, Noyes FR. The effect of neuromuscular training on the incidence of knee injury in female athletes: a prospective study. Am J Sports Med 1999; 27: 699-706.
8) Orchard J, Potential to reduce the risk of noncontact anterior cruciate ligament (ACL) injuries. Am J Sports Med. 2005 Dec;33(12):1930; author reply 1930-1.
9) Dr J. Will a Nobel ever be awarded to someone in sports medicine or science? Sport Health 2005; 23(4): 4-6.
10) van Mechelen W, Hlobil H, Kemper HC. Incidence, severity, aetiology and prevention of sports injuries. A review of concepts. Sports Med. 1992 Aug;14(2):82-99.

Dear Editors

We read with some interest the item by Dr Kay Crossley in Volume 23, Issue 4 (Summer 2005-06) which described the status of knee injury research. It is very pleasing to see the leadership role of Australians in setting the research agenda in this important sports medicine area.

We thought that you may be interested also to know of a new large-scale randomised controlled trial of the effectiveness of a knee injury prevention strategy that has recently been funded by the National Health and Medical Research Council (NHMRC).

We believe this to be one of the first large-scale project grants awarded by the NHMRC in the area of sports medicine/sports science research. The team of researchers has been awarded a four-year project grant worth $1.067 million for the project entitled "A randomised controlled trial of exercise programs for preventing knee injuries".

This research project will address a significant Australian sports injury research priority.

Knee injuries account for >30% of all football injuries and they can be the most expensive to treat and rehabilitate. The knee injury prevention strategy being trialled is an implementation of a specially-designed aggressive balance and technique training program that has been shown to alter the neuromuscular and biomechanical factors related to injury mechanisms. These training-mediated changes should reduce the risk of injury. However, to date, the relative value of such training actually to prevent sports injuries has not previously been determined, even though it has been identified as a priority research area by the NHMRC and other groups.

Over the next four years, our study will:

1. implement a fully-piloted and tested exercise training intervention to reduce the number of football-related knee injuries;
2. evaluate the intervention's effectiveness in the real world context of community football; and
3. determine if the underlying neural and biomechanical training adaptations are associated with decreased risk of injury.

In doing so, the study will formally evaluate the effectiveness of exercise training programs (a widely promoted injury countermeasure) to prevent knee injuries in community-level footballers.

The study will monitor the relative trends in injury incidence, safety behaviours and attitudes over the duration of the RCT. Exposure-adjusted injury rates in the intervention arm will be compared to those in the control arm. Changes in attitudes and safety behaviours in each arm will be analysed, relative to concurrent changes, if any, in the controls. Although the project will only be recruiting community-level Australian (Rules) footballers, it will have broader application to participants of other sports with a significant risk of knee injury such as netball, basketball and other football codes.

In order to progress sports safety efforts, it is important that implementing any sports safety strategy, such as exercise training regimens, is demonstrated actually to meet its desired objectives (ie, increase adoption rates and reduced injury rates).

To date, there have been very few internationally-published formal evaluations of sports injury prevention measures such as training programs.

In addition, the project will establish that sport safety strategies developed by studying the injury mechanisms and preventative measures in a laboratory setting can develop effective community-based injury reduction interventions. Finally, by demonstrating the effectiveness of these football injury interventions in the field, it will support Australian leadership in sports safety research and assist the delivery of safe sport in Australia.

Caroline Finch, David Lloyd and Bruce Elliott.

The writers -- Professor Finch (The University of New South Wales), Dr David Lloyd and Professor Bruce Elliott (both from The University of Western Australia) -- are Chief Investigators on the project research team.

The ACL reconstruction question: bone-patellar tendon-bone vs. hamstring tendon

by AJ Chapman, JRD Murray, TM Cross and MJ Cross

ABSTRACT
ACL reconstruction is most commonly performed with bone-patellar-tendon bone (BTB) or hamstring autograft. We present the argument in favour of the BTB graft and describe the operative technique used. We believe the BTB graft offers the most stable knee post reconstruction and that this therefore is most appealing in the elite athlete and the general population. Donor site morbidity can be minimised with simple techniques such as double incision graft harvest and bone grafting of the patellar and tuberosity defect

Function, mechanism of failure and anatomy

The primary role of the ACL is to control the "screw home" mechanism of the knee, by which the tibia rotates on the femur during terminal extension to 'slot in' to the fully extended position of the knee. The secondary functions of the ACL are control of antero-posterior glide at 90° flexion and prevention of hyperextension. Failure of any of these three mechanisms results in ACL rupture. Failure of the screw home mechanism occurs between 0° and 25° when the knee gives way on rotation. Thus the most common cause of ACL rupture is internal rotation of the tibia during the side-stepping or cutting manoeuvre with the knee between 0° and 25°. This mechanism also occurs when one lands from a jump with a simultaneous rotatory landing force. Hyperextension or contact forces are uncommon mechanisms of injury, though it is possible to rupture the ACL with an over-reaction of the quadriceps particularly when the knee is at 90°. Many authors believe that ACL lesions occur when there is lack of co-contraction of the hamstring/quadriceps muscular sleeve, increasing the forces through the static stabilisers of the knee.

Direct injuries to the lateral aspect of the knee where there is rupture of the medial collateral ligament, avulsion of medial meniscus and rupture of the ACL often with a radial tear of the lateral meniscus is the "unhappy triad" originally described by Dr O'Donohue. Importantly the meniscus is avulsed, not torn and can always be preserved in this mechanism of injury.

The ACL attachments are a large footprint on the intercondylar eminence of the tibia and stretch proximally to the posterior juxta-articular area on the lateral femoral condyle.

Because of the posterior offset of the femoral condyles, the attachment of the ACL is the most posterior structure in the normal anatomical position and arthroscopically is at "1:30 o'clock" in the intercondylar notch of the right knee and at "11:30 o'clock" in the left knee. It is important to note these anatomical attachments so as to avoid a common mistake in ACL reconstruction often made when the femoral attachment is performed at "12 o'clock". This is approximately 10 mm to 12 mm anterior to the true attachment of the ACL and can lead to failure of reconstruction.

Treatment of ACL rupture

Treatment can be divided into acute repair, acute repair with augmentation and reconstruction of the ACL. In very few cases the ACL can be avulsed from the lateral femoral condyle or from the tibia with a bone fragment. In these cases successful acute repair can be performed. It is also possible to reinforce the avulsion or the tear of the ACL with an augmentation with the semitendinosus and gracilis tendons and this is the preferred method of treatment in pre-pubescent children. In both these cases repair must occur before the ACL dissolves and thus is a matter of relative urgency in order for a successful result to be achieved.

The four types of ACL reconstruction are:

1. BTB reconstruction,
2. quadruple hamstring reconstruction,
3. quadriceps tendon reconstruction, and
4. allograft reconstruction: BTB, hamstrings, Achilles tendon, quadriceps.

Of the above, allograft reconstruction is rarely performed in Australia. Quadriceps tendon reconstruction is not an accepted method of treatment. Allografts obviously remove the problem of donor morbidity, but at the cost of potential infection, rejection and failure of integration; the use of allografts is more common in the United States and United Kingdom particularly in the multi-ligament or revision setting.

Thus the debate is centred on the advantages and disadvantages of BTB reconstruction and the quadruple hamstring reconstruction, with multiple surveys in Australia and overseas showing no consensus yet as to the graft of choice[1].3

The arguments for BTB graft

1. Superior fixation

The main advantages of BTB reconstruction arise because it is the most physiological reconstruction. The native tendon is already connected to the bone blocks and bone-to-bone (block-to-tunnel) union occurs within six weeks. Hamstring tendon connection is an indirect one, made between the tendon and newly-woven bone by connective tissue called Sharpey's fibres. There is also strong evidence from animal studies to suggest that, because of a variety of biochemical and biomechanical insults, hamstring healing of tendon graft in the bone tunnel is delayed and weaker[2]. Fixation of the hamstring graft within the femoral tunnel with a screw can also compress and squash the tendon fibres; it does not always guarantee the formation of Sharpey's fibres and tendon healing in all cases. Proponents of hamstring grafts have realised this and have developed reverse thread screws to attempt to solve this problem.

In the BTB graft, the bone plug in the femoral tunnel can be fixed such that the tendon is flush with the outlet and does not suffer the "windscreen wiper" effect that occurs when the hamstring tendon rubs over the rim of the outlet of the tunnel.

The other advantage is that it is possible to put more tension on the BTB graft by using the "block and tackle" technique on the tibial bone plug. This rigid fixation means there is no intra-tunnel loss of tissue or possible slippage/non union of tissue.

"Block and Tackle" technique: allows rigid fixation of tibial bone plug to tibial post screw

The most conceptually secure way to fix a quadruple hamstring is with a Transfix bar into the femur as you do not get the effect of damage to the tendon with an interference screw. However, you do have the disadvantage of the "windscreen wiper" effect as well as increased tunnel size which is more common in hamstrings than in patella tendon reconstructions[3,4,5]. This increased tunnel expansion may be indicative of non-healing of the tendon in the tunnel and excessive movement.

Fixation distally of hamstrings is still often performed with staples, but, if you attempt to use an interference screw fixation in the tibia, there is a tendency to push the graft towards the joint as the screw is inserted despite simultaneous pulling on the tendon. The other disadvantage of interference screw fixation in the tibia is that there is soft tibial bone and the screw can migrate in this soft tibial bone. For this reason sole use of interference screw fixation is not recommended in the tibia for BTB reconstruction as the screw can migrate and the graft bone block can be pushed proximally to the Joint.

Screw migration

Interestingly, if the interference screw is a satisfactory method of fixation, why does there seem to be a continuing scientific search for new methods of hamstring fixation?

2. Less stretching

It has been demonstrated in numerous RCTs and meta analysis that there is increased laxity on both clinical examination and arthrometer testing in those patients who have had a hamstring reconstruction compared to those who have had a patella tendon reconstruction[4,6,7]. These studies all show less absolute AP movement with the BTB graft, but within the power of these studies there is no statistically significant difference compared to the hamstring grafts. Feller et al demonstrated high rates of failure of bone filling-in of the graft tunnels in the hamstring groups which did not occur in the BTB group[4]. More recently, Bizzini et al showed hamstring reconstructions to have significantly greater knee joint laxity on arthrometer testing when compared to BTB reconstruction[8].

This may be attributed to a tendency for hamstring tendons to stretch and because it is not possible to achieve tight fixation as with the block and tackle method mentioned above. There is also a practice of tightening the hamstring graft at 30° flexion with the prediction that the graft will stretch. Therefore the question must then be asked why use a graft where stretch and laxity is an expected outcome?

The basic physical properties of stretch mean that, the shorter the tendon, the less stretch that can occur. This is one of the disadvantages of using the Endobutton because any slight stretch per unit length will be amplified with a longer graft construct, resulting in greatly increased laxity.

3. Reduced re-ruptures

Though RCTs have not shown the difference in re-rupture rates to be statistically significant, it is our experience, particularly in elite athletes, that hamstring grafts more commonly result in re-tears. The major cause of re-rupture is of course graft independent and is due to mal-positioning of the bone tunnels.

Due to the increased joint laxity and a rate of ACL rupture in female athletes 2-8 times that of males[9], some studies have advised caution with the use of hamstring reconstruction in females[8]. It is our belief that there should not be a distinction based on sex or level of activity; if the patella tendon is the best reconstruction for the elite athlete, then it should be offered to all patients.

4. Morbidity

It is widely accepted that patella tendonopathy, disturbance of sensation over anterior knee and kneeling pain are more common after BTB grafts[3,6,7,10,11], though this rarely affects return to sport or activity that does not involve kneeling.

It is our practice and studies suggest that, by taking cored cancellous bone blocks from core reamers and grafting the patella and tibial tuberosity donor sites, anterior knee pain is reduced[12]. Also, by using a two incision technique when harvesting the patella tendon graft, preservation of the infrapatellar branch of the saphenous nerve may contribute to the prevention of anterior knee sensory disturbance[12].

It is worth remembering that chronic hamstring pain occurring after semitendinosus and gracilis harvest, while rare, can be disabling. By removing two hamstrings, the H:Q ratio will also decrease, which may lead to further instability.

5. Late onset arthrosis

It has recently been suggested that, following ACL reconstruction, there is an increased risk of radiological degenerative joint disease with BTB rather than hamstring grafts at seven years post-surgery[11]. This raises the question why should the hamstring graft have chondro-protective properties? One suggestion may be that the increased laxity of the hamstring graft may be beneficial in preventing the onset of osteoarthritic change. Importantly, though not statistically significant, there was an increased incidence of graft rupture in the hamstring group compared to BTB group (4 vs 9 p=0.15). Interestingly, there was also an increased rate of contralateral rupture of the native ACL in those patients who had received the BTB graft[11]. It is our belief that this suggests that patients receiving hamstrings are less likely to return to full activity and therefore that the hamstring reconstruction is not functioning sufficiently for the subjects to return to an injury-prone environment. This means they are not able to participate at a higher level of sport and hence function better. It also should be noted that this study was not an RCT and similar results have not been matched by other authors as yet.

Follow up of anterior cruciate reconstruction

This patient population is highly mobile (often due to employment moves) and complete follow-up is extremely difficult. This has been attempted by the senior author (MC) on a number of occasions and, even with due diligence, having access to many methods of tracing, we have only been able to contact approximately 75% of patients. These patients are usually active, in full time employment and often with young families; taking time to return questionnaires and return to clinic for clinical and radiological examination when their knees are functioning well is not in their interest.

The other difficulty with assessing anterior cruciate laxity is that maximal KT1000 has been found to be unreliable; it depends on the strength of the person doing the test. It is generally acknowledged that a totally independent person should be performing the jerk test or the lateral pivot shift which is the true indicator of anterior cruciate success rate in reconstruction. Accurate use of the lateral pivot shift or jerk test is dependent on significant experience of the examiner and on full cooperation of the patient.

The ultimate aim of reconstruction of the anterior cruciate ligament is to anatomically restore the function of that ligament to allow return to pre-morbid function and level of play. We believe this is best done with a graft associated with the lowest chance of future stretch.

Thus the true test of anterior cruciate reconstruction is the number of patients who return to their previous activity or level of play; this is particularly sensitive with the elite athlete.

In the amateur population, where all RCTs have been performed, it is impossible to account for voluntary drop-out of high risk sports at a future date. It is also impossible to assess properly how much graft function caused this drop-out. In other words, if a patient is five years post-ACL reconstruction and no longer plays contact sports (but did for a year or two post-surgery) was the reconstruction primarily responsible for the reduction in sporting activity or was it patient choice for whatever reason (eg, patient is older, has less time from work, has more family demands on time, etc).

The return rate and re-rupture rate in elite athletes (NRL players, AFL players, international rugby players, Olympians) is a better true guide to graft survival, as the drop-out rate from professional sport (other than age-enforced retirement) is very low. The reason those who drop out prior to their predicted sporting lifespan is usually injury (eg, graft failure). Graft choice for ACL reconstruction within the professional athlete population is more commonly a BTB than hamstring graft[1].

The senior author (MC) has performed BTB reconstructions on more than 60 International-level athletes with only two known reconstruction failures in this group; this is a lower rate than other authors have reported even in the amateur population.

Acknowledgement

Thanks are due to Chris Servant, consultant orthopaedic knee surgeon at Ipswich Hospital in the UK, who wrote the operative protocol when he was Dr Cross's Fellow in 2001. His original protocol has been abridged for this article.

The authors practice at the North Sydney Orthopaedics and Sports Medicine Centre in Sydney, New South Wales.

References

1. Bartlett RJ, Clatworthy MG, Nguyen TN. Graft Selection in Reconstruction of the Anterior Cruciate Ligament. J Bone Joint Surg Br 2001;83:625-634
2. Demirag B, Sarisozen B, Ozer O, Kaplan T, Ozturk C. Enhancement of Tendon-Bone Healing of Anterior Cruciate Ligament Grafts by Blockage of Matrix Metalloproteinases. J Bone Joint Surg Am Vol 87; No. 11; Nov 2005
3. Aglietti P, Giron F, Buzzi R, Biddau F, Sasso F. Anterior Cruciate Ligament Reconstruction: Bone-Patellar Tendon-Bone Compared with Double Semitendinosus and Gracilis Tendon Grafts. J Bone Joint Surg Am 2004;86:2143-2155
4. Feller JA, Webster K. A Randomized Comparison of Patellar Tendon and Hamstring Tendon Anterior Cruciate Ligament Reconstruction. Am J Sports Med 2003;31:564-573
5. Webster K.E Feller JA Hameister Bone tunnel enlargement following anterior cruciate ligament reconstruction: a randomised comparison of hamstring and patellar tendon grafts with 2-year follow-up. Knee Surg Sports Traumatol Arthrosc 2001; 9:86–91
6. Freedman KB, D'Amato MJ, Nedeff DD, Kaz A, Bach BR. Arthroscopic anterior cruciate ligament reconstruction: a Metaanalysis comparing patellar tendon and hamstring tendon autografts. Am J Sports Med 2003;31:2-11
7. Spindler KP, Kuhn JE, Freedman KB, Matthews CE, Dittus RS, Harrell FE. Anterior Cruciate Ligament Reconstruction Autograft Choice: Bone-Tendon-Bone Versus Hamstring. Does It Really Matter? A Systematic Review. Am J Sports Med 2004;32:986-1995
8. Bizzini M, Gorelick M, Munzinger U, Drobny T. Joint Laxity and Isokinetic Thigh Muscle Strength Characteristics After Anterior Cruciate Ligament Reconstruction: Bone Patellar Tendon Bone Versus Quadrupled Hamstring Autografts. Clin J Sports Med 2006;16:4-9
9. Ahmad C, Clark M, Neils H, Schoeb JS, Gardner T, Levine W. Effect of Gender and Maturity on Quadriceps-to-Hamstring Strength Ratio and Anterior Cruciate Ligament Laxity. Am J Sports Med 2006;34:370-373
10. Matsumoto A, Yoshiya S, Muratsu H, Yagi M, Iwasaki Y, Kurosaka M, Kuroda R. A Comparision of Bone-Patellar Tendon-Done and Bone-Hamstring Tendon-Bone Autografts for Anterior Cruciate Ligament Reconstruction. Am J Sports Med 2006;34:213-219
11. Roe J, Pinczewski L, Russel V, Salmon L, Kawamata T, Chew A. 7-Year Follow-up of Patellar Tendon and Hamstring Grafts for Arthroscopic Anterior Cruciate Ligament Reconstruction: Differences and similarities. Am J Sports Med 2005;33:1337-1345
12. Tsuda E, Okamura Y, Ishibashi Y, Otsuka H, Toh S. Techniques for Reducing Anterior Knee Symptoms after Anterior Cruciate Ligament Reconstruction Using a Bone-Patellar Tendon-Bone Autograft. Am J Sports Med 2001;29 450-456

ACL Reconstruction
BTB operative protocol

Indications

- Tear of ACL diagnosed clinically +/- MRI diagnosis.
- Instability, giving way, knee pain and inability to participate in sporting activities.

Pre-operative Assessment

- Dynamic extension, Lachman + jerk tests.

Set-up

- Supine position.
- Thigh tourniquet (inflated with knee flexed).
- Lateral thigh support: vertical support at level of tourniquet.
- Foot support to maintain knee flexed 90°.
- Knee prepared + draped.
- Disposable full-length stockinette, pulled up to just below tibial tuberosity.
- Disposable ACL drape.
- 2 saline inflows.

Incision

- Two longitudinal incisions of 2 cm for taking the graft.
- Upper incision placed at the distal aspect of the patella and the lower just medial to the tibial tubercle.
- Arthroscopy portals: high anterolateral, low anteromedial (close to tendon) + superolateral (2nd inflow); the lower patella tendon incision is also used.

Procedure

Harvesting of graft

- The central one-third of the patellar tendon is identified (there is a constant blood vessel at the junction of the middle and lateral thirds).
- Paratenon and bursal tissue is cleared off the anterior surface of the tendon.
- The bone blocks are marked out by incising the periosteum over the lower patella and tibial tubercle, using a No.15 blade.
- A trapezoidal-shaped bone block (approx 20 mmx10 mm) depending on the size of the patient, is removed from the patella, using a combination of a micro-saw and osteotomes.
- The tidemark on the saw-blade is used to judge the depth of the saw-cuts (8 mm-10 mm).
- Osteotomes are used longitudinally to create stress risers around the bone block.
- The patellar tendon is incised subcutaneously using a No.10 blade, ensuring that a constant width graft is harvested.
- The patellar block, held within Kocher forceps, is passed down under the skin bridge into the distal wound.
- The tibial bone block (approx 25 mmx10 mm) is marked out by incising the periosteum down as far as the 'blue' area.
- A stress riser at the top of the tuberosity is made using an osteotome held transversely at an angle of 10°-20° above horizontal.
- The bone block is removed using a combination of a micro-saw and osteotomes.


Harvesting graft

- Remove all fat and excess soft tissue.
- The patellar and tibial bone blocks are then fashioned into appropriate bone plugs
- Measure the dimensions of both plugs (diameter and length) and the overall graft length.
- The femoral lead (bone plug) must be of equal or smaller diameter (than the femoral tunnel) and is fashioned into a bullet shape at the leading edge in the direction of graft passage. The femoral lead is normally fashioned from the tibial bone block as this has a more well defined bone-tendon interface than the patellar end. The plugs should have any bony ridges nibbled away.
- The intra-articular length of the graft should measure about 40 mm.
- Two evenly-spaced AP drill holes are made in each plug.
- Femoral plug: proximal 5 Ticron (looped and loop snugged down) + distal 5 Ethibond (unlooped).
- Tibial plug: proximal 5 Ethibond (looped) + distal 5 Ticron (looped) – the loops provide a block-and-tackle arrangement – see diagram – to allow for graft tensioning around the post screw; i.e. blue Ticron through the holes nearer to the ends of the plugs and green Ethibond through the holes adjacent to the tendon.
- The prepared graft must be kept moist by being wrapped in a saline-soaked gauze swab.

Preparation of graft

Operative Arthroscopy

- An arthroscopy is performed.
- Any meniscal or chondral lesions are dealt with accordingly.

Femoral Tunnel

- The notch is cleared using the power shaver and the stump of the old ACL removed.
- A notchplasty is performed if necessary, with a narrow osteotome being inserted via the anteromedial portal to remove part of the anterolateral notch.
- The posterior aspect of the lateral wall of the notch is curetted.
- An arthroscope is then inserted through the patellar tendon defect (the proximal incision).
- This gives a deeper view of the notch and allows placement of the femoral tunnel.
- Clearance of soft tissue from the notch gives a view of the position of the femoral tunnel 5 mm anterior to the true posterior capsular insertion and at the 10 o'clock (right) or 2 o'clock (left) position with respect to the apex of the notch.
- A bone awl (Steadman pick) is used to begin the femoral tunnel, aiming to create a tunnel that leaves a 2-mm thick posterior wall.
- Fully flex the knee and, via the anteromedial portal, insert a drill guide that hooks over the back of the condyle.
- Start a drill hole using a 2.5-mm AO drill, aimed approximately 30° lateral and 30° anterior to the femoral axis, check its position and if satisfactory then continue with a 3.2-mm AO drill, passing all the way through the femur.
- A 2.4-mm Beath pin is placed in the drill hole followed by an appropriate-sized cannulated drill (typically 9 mm-11 mm) inserted to a depth just greater than the length of the femoral bone plug.
- The posterior wall of the femoral tunnel is tested with a probe.
- The Beath pin is withdrawn partly such that the tip protrudes out of the thigh and the threadable end lies just within the femoral tunnel.

Tibial Tunnel

- The tibial tunnel is created using an Acufex drill guide, with the guide's tip inserted through the anteromedial portal.
- The correct angle of the guide should be set to ensure a correct length of tibial tunnel:

  graft length >90 mm, 60° from horizontal

  graft length 80 mm-90 mm, 55°

  graft length <80 mm ,50°.
- The tip of the guide is placed within the remnants of the stump of the ACL at a position one-third of the distance from the medial end of a line joining the anterior horn of the lateral meniscus and the medial tibial spine (up against the PCL).
- The drill guide is then pushed against the anteromedial cortex of the tibia (within the distal wound), making sure that it is below the lower extent of the tibial graft trough.
- A 3.2-mm drill hole is created into which a blunt pin is inserted.
- The intra-articular position of the pin is checked arthroscopically.
- A tunnel is then started using the appropriate-sized cannulated drill (usually 9/10 mm).
- The blunt pin is replaced with the obturator of a bone corer and the tunnel is completed using the appropriate-sized bone corer.
- The bone core is kept for grafting into the patellar and tibial defects later in the procedure.
- The length of the tibial tunnel is usually 45 mm-50 mm.
- Debris including any remaining stump of the ACL at the aperture of the tibial tunnel is removed to avoid impingement when the knee is fully extended ('a cyclops lesion').

Graft Passage

- The Beath pin within the femoral tunnel is passed back into the knee joint and pulled out through the anteromedial portal using pituitary rongeurs.
- The two ends of a nylon pull-through suture are inserted into the end of the pin.
- With a finger holding the loop of the nylon suture, the Beath pin is pulled back through the joint and out of the thigh, bringing the ends of the nylon suture with it.
- The nylon loop is pulled into the joint and then pulled out through the tibial tunnel using rongeur.
- The patellar tendon autograft is then unwrapped and the sutures of the femoral plug are passed through the nylon loop.
- By pulling the nylon loop through the knee and out of the thigh the femoral plug sutures are pulled out through the thigh.
- By pulling selectively on either just the lead suture (Ticron) or both sutures, the femoral bone plug is positioned in its tunnel, with the cancellous side facing anterosuperiorly.
- Make sure that the tibial plug is sufficiently inserted into its tunnel not to be placing tension on the graft: the cancellous side should be facing anterosuperiorly as well.
- A probe, rongeurs or awl may be needed to guide the plug around the PCL into the tunnel.
- A prominent PCL may prove less of an obstruction with the knee in the figure-of-4 position.
- A tight plug may need to be punched home.

Graft Fixation

- Hold the tibial plug sutures firmly to prevent proximal migration of the femoral plug.
- With the knee fully flexed, insert a blunt pin via the anteromedial portal into the interface between the femoral tunnel and the cancellous area of the femoral bone plug to allow parallel placement of an interference screw with the bone plug.
- Start the screw hole using the cannulated screwdriver (or, if the bone is especially hard, use a chipper).
- Insert a 7-mm x 25-mm interference screw, using a Bristow applied to the screwdriver to increase the torque when tightening the final few turns.

Femoral screw pushes graft into tunnel.

- Firm traction is then applied to the tibial bone plug while the knee is taken through a full range of movement to pretension the graft and to observe full extension without impingement.
- The knee is extended fully (lift foot when tightening sutures).
- A 5-mm x 25-mm post screw is inserted into the anteromedial aspect of the proximal tibia, just below the tibial tunnel.
- When drilling the pilot hole, direct the drill slightly caudally.
- Position the loop of the proximal tibial plug suture (green Ethibond) around the post screw and tie this suture firmly, using the block-and-tackle method.
- Repeat this using the distal suture (blue Ticron).
- Tighten the post screw using block-and-tackle technique.
- An 8-mm x 20-mm interference screw is then inserted parallel and anterior to the tibial bone block.
- Stability is checked by performing a Lachman test intra-operatively.

Closure

- Bone graft (including the bone core) is inserted into the patellar and tibial defects.
- The patellar tendon is then closed with 2/0 Vicryl.
- The wound is closed over a suction drain.
- 10 mL of 0.25% Marcain is instilled into the joint and around the portals.
- Subcutaneous 2/0 Vicryl.
- Subcuticular Monocryl skin closure.
- Wool and crepe dressing.
- Hinged knee brace locked to allow flexion from 0° to 90°.

Post-operative Rehabilitation

- Patients begin weight-bearing on crutches immediately.
- Simple analgesics for pain control.
- Usual time in hospital is two nights.
- A hinged brace is advised for approximately two weeks, but longer with generalised ligamentous laxity.
- Daily physiotherapy to reduce postoperative swelling and to allow active exercises aiming for full extension by 14 days.
- Review at 10 to 14 days for wound inspection and suture removal.
- Further review at six weeks, six months and then yearly.
- Intensive rehabilitation program including closed-chain exercises and an emphasis on proprioceptive re-training.
- The Dr Cross protocol is available on request or online at www.kneeclinic.com.au for the treating physiotherapist and physician.
- At six weeks, patients begin jogging in straight lines, swimming and using a bicycle.
- From 12 weeks general strengthening exercises are continued with agility work and sporting activities encouraged.
- Return to competitive sport involving jumping, pivoting or sidestepping is prohibited until six months after the reconstruction.

Complications

- Patella fracture.
- Chronic patellofemoral pain – kneeling pain.
- Patella tendon rupture.
- Patella tendonopathy and calcification.
- Graft fixation screws prominence.
- Graft failure.
- Stiffness – and Cyclops lesions preventing full extension.
- Cysts of the ACL.
- General complications; infection, DVT, haemarthrosis, nerve injury, complex regional pain syndrome (CRPS or RSD).

Preparation of graft





» *Continued on page 27*

Mouthgards in sport

Protecting your teeth: The boil-n-bite mouthgard may be cheaper but is it better?

John I Banky

Choosing the right mouthguard sounds simple but some specialised knowledge is useful when providing a guide that is practical, non-technical (ie, written in language which is clear and easily understood), accurate and current (reflecting latest published studies).

According to Sports Medicine Australia's Sports Trainers Manual, an acceptable mouthguard should:

- fit well, be comfortable and not dislodge on impact,
- provide adequate thickness of material (ie, 4 mm) to cover vulnerable areas (usually the upper teeth up to and including first molar teeth) to reduce impact forces, and
- ensure that large areas of the guard's biting surface contact the teeth in the opposing arch when biting lightly to minimise jaw fracture.

Articles discussing dental injury and mouthguards can always be found in dental journals. There is growing awareness by a wide range of other health and allied practitioners about the physical, psychological, functional and economic consequences of dental injury.

In a joint media release in July 2002 by SMA and the Australian Dental Association (ADA), Dr Richard Butler, Executive Director of the ADA, pointed out that "only a custom-fitted mouthguard can accommodate the unique arrangement and number of teeth but also ensure adequate thickness of material protects the vulnerable areas". The release went on to criticise a review of mouthguards published that month in the Australian Consumers Association's Choice magazine as "containing misleading and inaccurate information which, if unchallenged, will undoubtedly result in more dental traumatic injury that is immediate, permanent and distressing".

Despite this, the Consumers' Institute of New Zealand recently published on its Consumers Online site (www.consumer.org.au) a review of mouthguards containing the same confusing and inaccurate information about mouthguards as that published in Choice. Indeed, the similarity of both reviews is remarkable.

First, the New Zealand review states that "any mouthguard is better than no mouthguard". In fact, boil-and-bite mouthguards offer minimal protection and provide a false sense of security[1] which could easily predispose to injury or worse, according to a study[2] which cites a potentially life-threatening incident as reported in the Sunday Mail ("Brisbane schoolboy swallows mouthguard") in 1995.

Then the review acknowledges that dental experts recommend custom-fitted mouthguards; eg, "the New Zealand Dental Association, like most of its overseas counterparts, recommends for the best protection and fit that children and adults should use custom-fitted mouthguards".

It quotes the views of its own experts, Dr. Susan Cartwright and Dr Stephen Simmons, on the merits of custom-fitted guards over boil-and-bites and the reasons why boil-and-bite mouthguards should not be used.

Dr Cartwright (dentist and mother of three teenage sons): It can be difficult to form and fit boil-and-bite mouthguards properly. Biting the guard when the temperature of the mould is too low or biting in the wrong place can result in discomfort and a sloppy fit. Kids will spit them out every five minutes, whereas a custom-fitted guard will stay in the whole game.

Dr Simmons (dentist to the Crusaders rugby union team): I have seen few, if any, boil-and-bite mouthguards that fulfil the important features of retention, widespread tooth cover, correct thickness and fitting. Therefore custom-fitted mouthguards are preferable to store-bought mouthguards. It's important to remember that bones heal and teeth don't - a broken tooth is for life.

The review recounts the experience of an elite New Zealand female hockey player who comfortably wears a custom-fitted guard during practice and matches and who prefers the custom-fitted guard because it minimally affects breathing and provides greater comfort.

It advises that "the main advantage of custom fitting is that it allows the dentist to assess your mouth before the guard is made and the dentist can accurately achieve the optimum dimensions, coverage and thickness of the guard".

Then, after all this, it recommends three boil-and-bite mouthguards and instructs consumers on where to get them and how to fit them.

Cost and fit

The Institute advises that, "in the end, your choice may well be based on cost and how important a good fit is".

The pressure-laminated guard as used by the elite hockey player mentioned above is not a typical guard. Nevertheless the review emphasises the cost of these pressure-laminated guards; eg, "You'll pay at least $100 plus dental fees and sometimes up to $300 plus dental fees. A single-layered vacuum guard generally costs around $80 to $100." Then, by contrast, it highlights the minimal cost of boil-and-bite guards; eg, "These ranged in price from $NZ3 to $NZ40."

On fit, it itself acknowledges a major concern about boil-and-bites: "They are generally made in (only) three standard sizes. As everyone has a different set of teeth there won't be a mouthguard that can be easily adapted to fit all mouth shapes."

The fact of course is that only a custom-fitted mouthguard is able not only to accommodate the unique arrangement and number of teeth but also ensure that adequate thickness of material protects vulnerable areas.

Secure fit means minimal interference with speech and breathing, a more comfortable guard which is more likely to be accepted by the wearer. As the review itself states: "Where the custom-fitted mouthguards stood out was that they fitted better and stayed in place during the impact testing compared with the majority of the boil-and-bites."

Testing

The Institute's recommendations are based on its tests – described as "an impact test and an expert assessment of boil-and-bites" -- on 16 boil-and-and-bite and two custom-fitted mouthguards, conducted by an unnamed laboratory in Auckland.

It reports that these tests showed that "the custom-fitted mouthguards...did not provide more protection than the boil-and-bites: one of the custom-fitted guards was amongst the worst in the impact testing".

Minimal information is provided about these tests.

What do their results mean?

Replicating the mechanical behaviour of the real tooth-bone complex is difficult[3] because the tooth supporting structure (periodontal ligament) is far less stiff than tooth enamel[4].

Without knowing the Institute's testing method, it is impossible to compare its results directly with published impact test studies on mouthguard material[5,6,7]. By coding its results with stars, the Institute's review makes direct comparison with any published data impossible. Perhaps this was its intent, preferring a direct comparison of only those items which it tested.

The Institute describes how the boil-and-bite mouthguards "were moulded according to manufacturers instructions..." and "... the mouthguards in our test…were moulded to a dental model".

In real life, self-moulding mouthguards are removed from the mouth while warm (it's uncomfortable to leave one in place when it's hot anyway). The mouthguard material distorts/loses shape while cooling, severely compromising final fit.

According to Dr Cartwright (the expert mentioned above), "it can be difficult to form and fit boil-and-bite mouthguards properly. Biting the guard when the temperature of the mould is too low or biting in the wrong place can result in discomfort and a sloppy fit." If the boil-and-bites in the Institute's tests were moulded and left to cool on a model, the final fit would be much better than in real life!

The review says that the tests used dental models so it "could not assess the comfort and fit of the mouthguards..(comfort and fit) is an important consideration when buying a mouthguard".

A guard which is uncomfortable will not be worn![8].

Poor design (bulkiness and mouthguard coverage) is the next common reason after poor fit for poor tolerance of mouthguards[9].

Modification(s) to the guard by the wearer to improve comfort often reduces "bulk" by shortening the mouthguard posteriorly[10], significantly reducing protection from impact forces on the underlying teeth.

The review observes that some of the guards tested had inserts within the mouthguard material to improve protection offered by the guard. Dr Simmons (the other expert quoted in the review) responds that "there is no substantive scientific evidence that shock absorbers or other inserts improve the performance of a mouthguard". This is supported by published research[11,12].

In other words, the opinions of the institute's own expert are ignored.

Both Dr Cartwright and Dr Simmons (as quoted in the review) highlight the major concerns about boil-and-bite mouthguards which are well documented in published studies:

- inability to ensure adequate thickness of mouthguard material covering vulnerable areas[2,3,4,13,14,15], and
- proper fit including the opposing teeth to minimise jaw fracture[16,17].

This quote attributed by the review to Dr Simmons (again, its own expert) says it all: "I have seen few, if any, boil-and-bite mouthguards that fulfil the important features of retention, widespread tooth cover, correct thickness and fitting. Therefore custom-fitted mouthguards are preferable to store-bought mouthguards." (This is the position of both SMA and ADA). Again: "It is critical that the guard is an excellent fit and covers at least behind the first molars. There are only three sizes of (boil-and-bite) guards available off the shelf and buyers are limited to the nearest size fits best… and no expert to help properly fit the mouthguard."

» *Continued on page 28*

Does travel affect longevity in the AFL?

Brian Dawson

Soon after winning the 1992 AFL premiership, the then West Coast Eagles (WCE) coach Michael Malthouse, was told by former St. Kilda and Hawthorn coaching legend Allan Jeans to "make the most of it now, because the travel won't let you stay on top for too long".

On 24 November, 2005, the Perth newspaper The West Australian reported on WCE player Phil Matera's retirement from the AFL under the headline "Travel takes a terrible toll, says Malthouse". The article, by sports reporter Mark Duffield, began with the comment that "Collingwood coach Mick Malthouse claims that Phil Matera's shock retirement yesterday is further proof that air travel from WA shortens players' careers by more than a year". Further on, Duffield quoted Malthouse as saying: "It is the sheer nature of the travel. Phil Matera might have got another year and a half out of himself without it. It has a cumulative effect."

Both Matera and the WCE hierarchy refuted these claims, Matera explaining that he was retiring because of an on-going hip injury. However, the comments made about travel reflect a perception that players from non-Victorian clubs, who travel regularly throughout their careers, will accumulate travel related fatigue both across a season and across their careers, which may eventually see them retire prematurely from the game. Whether or not players from non-Victorian based clubs, such as the WCE, do have relatively shorter careers than players from Victorian based clubs is therefore the topic of this article.

Methods

Using existing AFL records of games played (The Encyclopaedia of AFL Footballers and AFL Record Guide to season 2005, plus AFL club websites), all players who have tallied 150 or more AFL games since 1987 to the end of 2005 were listed, firstly for each individual club and secondly as a "non-Victorian" or "Victorian" club-based player. The season 1987 was used as the starting point for the analysis, as this was the first year in which the West Coast Eagles and the Brisbane Lions entered the competition, thereby setting up a situation whereby teams were travelling to and from Victoria to play games on a more regular basis. Prior to this, the Sydney Swans had been based in Sydney since 1982, as the sole "travelling" team in the old VFL.

In establishing the lists of players who had played 150 or more games between 1987 and 2005 (inclusive), the following criteria were applied:

a) only players who began their AFL careers in 1987 (or later) were included;

b) Only AFL games were counted. State league games in WA, South Australia, Queensland, New South Wales and Victoria played during this period were not included; and

c) Fitzroy, who played in the AFL until 1996, were excluded, but players who played with Fitzroy and then with another club were included in the data set.

One complicating factor in the analysis was that a lot of eligible players have played for two or more clubs over this period and in many cases have represented both a "Non-Victorian" and "Victorian" club across their career. For the club-by-club listings, these players were included under the club for which they have or had played most games; for example Kane Johnson, currently at Richmond, where he has played 57 games, is listed for Adelaide, where he started his career and amassed 104 games.

Because of the prevalence of players representing two or more clubs, the following categories of players were established:

a) non-Victorian, one club players (Non-Vic 1)

b) Victorian, one club players (Vic 1)

c) non-Victorian, two (or more) club players (Non-Vic 2)

d) Victorian, two (or more) club players (Vic 2)

e) "mixed" - Non-Victorian and Victorian club players (Mix)

An example of a Non-Vic 1 player is Glen Jakovich, who played all of his 276 games for West Coast. A Vic 1 example is Brett Ratten, who played all of his 255 games for Carlton. A Non-Vic 2 example is Jason Ball, who played 103 games for West Coast and 90 for Sydney. A Vic 2 example is John Barnes, who played 144 games for Geelong and 58 for Essendon. A "Mix" example is Alastair Lynch, who played 186 games for Brisbane and 120 for Fitzroy. Individual club results have also been presented with Non-Vic 2, Vic 2 and Mix players removed, so that the results for both Non-Vic 1 and Vic 1 players who have played their careers with only one club can be noted.

Career longevity was assessed for both club-by-club and non-Victorian- and Victorian-based players by using the following measures:

a) games played were separated into three categories: 150-199 games, 200-249 games and 250+ games, and the number of players and average total games played in each were tallied;

b) the total club games were calculated, along with total player games. This was done as follows: for each season 1987-2005 inclusive, the number of games played (including finals) by each club were tallied. For example, in 1992 West Coast played 25 games (22 qualifying + 3 finals). In each game in 1992, 20 players were selected for each game, so total player games for 1992 was 25 x 20 = 500. In making these calculations it was noted that 22 qualifying rounds have been played in each season -- except for 1993 when there only 20 home and away games -- and that for 1987-1993 (inclusive) teams had 20 players, for 1994-1997 (inclusive) 21 players and for 1998-2005 (inclusive) 22 players. As an index of longevity, the percentage of total player games played by 150+ game players was calculated, along with the average games played by 150+ game players.

c) Non-Vic (1 and 2) players were compared to Vic (1 and 2) players and Mix players by independent t test analysis to see if any differences existed in games played between these groups. In these calculations Non-Vic 1 and 2 and Vic 1 and 2 players were respectively pooled, after first checking that no significant differences existed between them for career games played.

Results

A summary of the results for the individual clubs of 150-199 game, 200-249 game and 250+ game players are presented in Table 1.

Table 1

Individual club tallies of players with 150-199 games, 200-249 games and 250+ games: 1987-2005. (Note: The numbers in brackets are the non-Victorian and Victorian one-club players and games; ie, those players who have changed clubs and continued their careers have been excluded.)

As mentioned above, players who have played for more than one club are included under the club for which they have played most games.

Table 1 shows, on the basis of total number of players with 150+ games for 1987-2005, that West Coast and Brisbane, with 22 and 21 players respectively have had the most, with the Kangaroos having the highest Victorian based club total (18). With only "one club" players considered, West Coast and Brisbane still remain at the head of the rankings, with 18 and 14 respectively. However, though total number of 150+ game players is one index of career longevity, total games played by 150+ game players is perhaps a better one, as it would be possible to have, for example, many 150-199 game players, but relatively few 200+ game players. Using this index, Brisbane (4740) and West Coast (4448) again head the list, followed again by the Kangaroos (4033). With "one club" players considered, West Coast (3702) and Brisbane (3102) again lead the way by a large margin.

Overall, these descriptive results suggest that regular travel doesn't seem to affect career longevity, but this is further analysed in Table 2, as it could be argued that West Coast and Brisbane have had most opportunity to have more 150+ game players than the old VFL clubs, by virtue of them being "new" teams in the competition. As a consequence, relatively more players may have made their AFL debuts in 1987 for these new teams than might normally be the case in one season for the old VFL clubs. However, while this might be a factor, such players must still have been able to play 150+ games to have qualified for inclusion in the data set.

Table 1

CLUB	PLAYERS WITH 150-199 GAMES	PLAYERS WITH 200-249 GAMES	PLAYERS WITH 250+ GAMES	TOTAL PLAYERS	RANKING	TOTAL GAMES PLAYED	RANKING
Adelaide	6 (3)	3 (2)	4	13 (9)	11 (5)	2793 (2070)	11 (6)
Brisbane	7 (6)	8 (3)	6 (5)	21 (14)	2 (2)	4740 (3102)	1 (2)
Carlton	8 (1)	6 (4)	1	15 (6)	8 (11)	3022 (1360)	9 (12)
Collingwood	7 (2)	6 (3)	3 (1)	16 (6)	4 (12)	3328 (1063)	5 (14)
Essendon	9 (4)	7 (5)	-	16 (9)	5 (6)	3348 (2099)	4 (4)
Fremantle	4 (1)	1	-	5 (2)	16 (16)	879 (379)	16 (16)
Geelong	4 (2)	6 (1)	2	12 (5)	14 (15)	2518 (1112)	14 (13)
Hawthorn	10 (6)	5 (2)	1	16 (9)	7 (7)	3054 (1361)	7 (11)
Kangaroos	4 (1)	9 (4)	5 (2)	18 (7)	3 (9)	4033 (1519)	3 (9)
Melbourne	7 (3)	5 (2)	3	15 (8)	9 (8)	3027 (1735)	8 (8)
Port Adelaide	8 (6)	2 (0)	1	11 (6)	15 (13)	2084 (986)	15 (15)
Richmond	10 (6)	3 (2)	3 (2)	16 (10)	6 (4)	3216 (2088)	6 (5)
St. Kilda	5 (2)	4 (2)	3 (2)	12 (6)	12 (14)	2675 (1469)	13 (10)
Sydney	10 (7)	4 (4)	1	15 (11)	10 (3)	2928 (2102)	10 (3)
West Coast	11 (8)	7 (6)	4 (4)	22 (18)	1 (1)	4445 (3702)	2 (1)
Western Bulldogs	5 (1)	2 (2)	5 (4)	12 (7)	13 (10)	2682 (1745)	12 (7)

Table 2

CLUB AND YEAR OF INCEPTION	SEASONS PLAYED	TOTAL CLUB GAMES	TOTAL PLAYER GAMES	% PLAYED BY 150+ PLAYERS	RANKING	AVERAGE GAMES BY 150+ PLAYERS	RANKING
Adelaide (1991)	15	348	7430	38% (28%)	5 (3)	215 (230)	5 (3)
Brisbane (1987)	19	439	9261	51% (33%)	1 (2)	226 (222)	1 (5)
Carlton	19	440	9265	33% (15%)	9 (13)	201 (227)	11 (4)
Collingwood	19	431	9073	37% (12%)	6 (14)	208 (213)	8 (9)
Essendon	19	447	9415	36% (26%)	7 (4)	209 (200)	7 (12)
Fremantle (1995)	11	243	5280	17% (7%)	16 (16)	176 (190)	16 (15)
Geelong	19	443	9322	27% (12%)	15 (15)	210 (222)	6 (6)
Hawthorn	19	437	9192	33% (15%)	10 (12)	191 (194)	14 (13)
Kangaroos	19	440	9273	43% (16%)	4 (10)	224 (217)	2 (7)
Melbourne	19	442	9303	33% (19%)	11 (8)	202 (217)	10 (8)
Port Adelaide (1997)	9	212	4642	45% (21%)	3 (7)	189 (164)	15 (16)
Richmond	19	422	8889	36% (23%)	8 (5)	201 (209)	12 (10)
St. Kilda	19	429	9037	30% (16%)	13 (11)	223 (245)	4 (2)
Sydney	19	434	9148	32% (23%)	12 (6)	195 (191)	13 (14)
West Coast (1987)	19	448	9427	47% (39%)	2 (1)	202 (206)	9 (11)
Western Bulldogs	19	429	9035	30% (19%)	14 (9)	224 (249)	3 (1)

Table 2 shows the seasons played by each club since 1987 or inception into the AFL competition, the total club games played and total player games, and also lists the percentage of total player games played by 150+ game players, as well as their average games played. Of the 16 clubs, Adelaide has played 15 seasons, Fremantle 11 and Port Adelaide 9; therefore their total club and player games are lower than for the other 13 teams, who have played 19 seasons.

Table 2

Seasons played, total club and player games and percentage and average games played by 150+ game players for each club. (Note: the numbers in brackets are the results for non-Victorian and Victorian one-club players; ie, those players who have changed clubs and continued their careers have been excluded.)

West Coast (448) has the most total club games for 1987-2005, one more than Essendon (447), with Geelong next (443). Total player games follow the same order (West Coast; 9427, Essendon; 9415 and Geelong, 9322). When the percentage of total player games played by 150+ game players is considered, Brisbane (51%), West Coast (47%) and Port Adelaide (45%) rank at the top, with the Kangaroos (43%) being the highest Victorian-based club. If only Non Vic 1 and Vic 1 players are considered, West Coast (39%) Brisbane (33%) and Adelaide (28%) are the top three clubs, Essendon (26%) being the highest Victorian-based team. Using average games played by 150+ game players, Brisbane (226), the Kangaroos and Western Bulldogs (both 224) and St. Kilda (223) are the top ranked clubs, with West Coast (202) ranking equal ninth with Melbourne. However, if only Non Vic 1 and Vic 1 players are considered, the Western Bulldogs (249), St. Kilda (245) and Essendon (233) take the top three rankings, with West Coast (206) ranking 11th.

Therefore, taken overall, the descriptive analysis of individual club lists of 150+ game players does not suggest that regular travel to play interstate by non-Victorian teams is a factor influencing career longevity. While the average games played by 150+ game players are highest in three Victorian teams, the other descriptive indicators of career longevity, namely total 150+ game players, 150-199 game, 200-249 game and 250+ game players and percentage of total player games played by 150+ game players, consistently see West Coast and/or Brisbane in the top ranked positions. Therefore, to analyse the issue of regular travel by non-Victorian teams and career longevity further, separate lists of non-Victorian, Victorian and mixed players were prepared, by pooling together individual club lists.

Table 3 presents these results.

Table 3

Average (± standard deviation) games played for non-Victorian, Victorian and mixed players. (Note: Non-Vic (1 and 2) represents non-Victorian one- and/or two-club players, Vic (1 & 2) represents Victorian one- and/or two-club players and Mix represents non-Victorian and Victorian club players. West Coast Eagles results are also presented here for comparison, with results for one-club players shown as well.)

Here, Non-Vic 1 and 2 players have been pooled together (in total, there were only six Non-Vic 2 players), as have Vic 1 and 2 players (there were 44 Vic 2 players). Before pooling these players together, it was established (independent t tests)

Table 3

GAMES CATEGORY	NON-VIC (1 AND 2)	VIC (1 AND 2)	MIX	WEST COAST EAGLES PLAYERS	WEST COAST EAGLES ONE CLUB PLAYERS
150-199	169 ± 13 (34 players)	171 ± 13 (46 players)	171 ± 13 (35 players)	170 ± 12 (11 players)	167 ± 10 (8 players)
200-249	223 ± 14 (18 players)	224 ± 16 (43 players)	223 ± 14 (17 players)	219 ± 13 (7 players)	220 ± 12 (6 players)
250+	274 ± 18 (13 players)	276 ± 22 (22 players)	285 ± 18 (7 players)	262 ± 6 (4 players)	262 ± 6 (4 players)
Total	204 ± 45 (65 players)	212 ± 43 (111 players)	199 ± 42 (59 players)	217 ± 9 (22 players)	216 ± 9 (18 players)
200+ games only	246 ± 30 (29 players)	242 ± 31 (65 players)	241 ± 33 (24 players)	234 ± 26 (11 players)	237 ± 25 (10 players)

that no significant differences existed between them in games played.

The results in Table 3 show that the average games played for non-Victorian, Victorian and mixed players are almost identical for 150-199 game players, 200-249 game players, 250+ game players, and for all players combined. Independent t tests showed there to be no significant differences between any of the groups and games categories. For comparison purposes, the average games played by West Coast Eagles players in each category and for all players combined are also presented, because players with this club will have travelled farther to play games than any other players in the 1987-2005 era. It can be noted that the values for WCE players are very similar to the Non-Vic, Vic and Mix group data.

Lastly, to check the possibility that these results might be different if the 150-199 game players were excluded from the analysis, the last row of Table 3 shows the results for only 200+ game players in each of the groupings. Once again, these average values were almost the same for non-Victorian, Victorian and mixed groupings, with no significant differences recorded between them. The West Coast Eagles averages are also shown for comparison purposes. If the West Coast Eagle players are taken out of the non-Victorian listing, the average games played for 200+ game players is hardly changed: 249, instead of 246 with the WCE players included.

Conclusions

These results clearly suggest that, in regard to career longevity in the AFL, whether a player represents one of the six non-Victorian clubs or a Victorian based club, is not an important factor. It can be inferred from these results that the regular travelling done by non-Victorian clubs does not appear to impact negatively on the length of their players' careers. **SH**

Professor Brian Dawson is at the School of Human Movement and Exercise Science at The University of Western Australia.

Whatever it takes

AUSTRALIAN PHYSIOTHERAPY ASSOCIATION
Sports Physiotherapy Australia

Geoff Kaplan, Assistant Athletic Trainer at the Tennessee Titans in the United States National Football League, explores a range of issues with his playing roster — doing whatever it takes to get his players on to the field in a big-money sport.

Geoff Kaplan

The role of the physical therapist, and the rehabilitation skills provided, are vital parts of the winning equation in the National Football League (NFL). The physical therapist is part of a healthcare team that includes certified athletic trainers, orthopaedic surgeons, internal medicine physicians and physical therapists. Some NFL teams also have chiropractors, massage therapists and active release therapists as part of their healthcare team.

It is important that all healthcare professionals know their role, and that the team works well together. It is of vital importance that medical care, treatment and rehabilitation be coordinated, thorough and of the highest quality. It is no secret in the NFL that, if your best players are not on the field because of injury, it is very difficult to win. Most physical therapists who are employed in the NFL are dual certified and licensed as physical therapists and certified athletic trainers.

The role of the physical therapist is becoming more popular in the NFL. Currently 10 of the 32 teams employ a full-time physical therapist and all are dual certified as a physical therapists/certified athletic trainers. Many teams employ physical therapists on an as-needed basis or outsourced from their local hospital.

NFL rosters are limited by two factors: roster size and the salary cap. Roster size is capped at 53 and the salary cap in 2005 was $US85 million. When a player gets injured and can no longer compete, his salary still counts against the salary cap. This rule means that it is crucial to be able to rehabilitate the players as fast and as thoroughly as possible because additional players cannot be hired due to salary cap restraints.

Most medical staffs in the NFL operate under the mantra of 'do whatever it takes' to help a player return to competition. Medical staffs in the NFL work long and hard days, typically 12-to 16-hour days and always work seven days a week. Seasons run from the end of July into January and typically involve no days off. If a player is injured, he is required to receive medical treatment and rehabilitation every day. Often, this will involve four to six treatment and rehabilitation sessions per day. The athletes in the NFL are some of the strongest, most coordinated, toughest and most athletic in the world. Because of their unique abilities, their rehabilitation programs must be unique and challenging.

When designing rehabilitation programs for these athletes, it is important to include exercises that challenge their strength and proprioception. The players are very strong and highly coordinated, so it is often important to be creative when designing rehab programs. We utilise rehab programs that incorporate many traditional strengthening exercises, but we make a very concerted effort to incorporate exercises that combine strength and proprioception training.

The style of football played in the NFL is extremely fast and physical; therefore, all rehab programs must include a few key components. These components are strength, speed, acceleration, power, balance/coordination and endurance. Before a player returns to competition, he must be able to return to his prior level or there is significant risk of re-injury.

Common injuries

Due to the fact the NFL is extremely physical there are many types of common injuries. These injuries range from contusions, strains and sprains to more significant injuries including muscle/tendon ruptures, fractures and ligament tears. The NFL season is only 16 games long, thus making each week and each game extremely important. Games are typically played on Sundays and it is common for treatment and rehab to start immediately after the injury.

The NFL is a high profile league that employs many valuable players and, because the players on each team are the team's biggest assets, no expense is spared when treating them. After an injury, the player will be evaluated by both a certified athletic trainer and physical therapist, and also by a board-certified orthopaedic physician. After the evaluation takes place, any special tests (Xray, MRI, CT scan, bone scan, etc) are ordered. All NFL stadiums are required to have Xray facilities, and many now also have MRI capabilities. The MRI exam is very common in the NFL, with each team performing upwards of 100 MRI exams per year.

After all the information is gathered, the player, team physician and athletic trainer discuss the injury and the rehabilitation plan is designed by the sports medicine team. In order to have a successful plan it is essential to have input from all entities.

The typical day for an injured NFL player is usually between eight and 12 hours in length; players are required to get treatment and perform rehabilitation exercises before and

after all meetings and practices. The Tennessee Titans require all injured players to report as early as 6:30 am and often the last treatments are being administered as late as 6:30 pm. Treatments include cryotherapy, heat modalities, hydrotherapy, ultrasound, laser therapy, light therapy, electrical stimulation, massage therapy, manual therapy and aggressively-designed rehabilitation programs.

In the NFL there are no financial or insurance constraints while treating players. Because all treatment and rehabilitation is done in-house, athletic trainers and physical therapists can utilise a 'shotgun approach'. This is when we use all of the modalities and treatment options available to us as often as we like with no financial or time constraints. This approach is one of many reasons why these athletes return to competition faster than the general population.

Typical rehabilitation

A typical rehabilitation program for a player at the Tennessee Titans incorporates four components: modalities, manual therapy, rehabilitation exercises and cardiovascular conditioning. No matter what the injury is, all rehabilitation programs from simple to advanced will incorporate these four components to some degree. During the rehab process it is not uncommon for NFL players to spend four to six hours per day rehabilitating their injuries.

NFL players are highly motivated and have a large financial stake in their ability to return from injury. NFL salaries range from the minimum of $US275 000 to multi-million dollar yearly salaries and, because of this opportunity to make large sums of money, players are extremely intense with their rehab programs.

A typical rehab program will start with a modality to either increase circulation or decrease swelling and then we will work on ROM, utilising both active range of motion (AROM) and passive range of motion (PROM) exercises. It is during this part of the program that we will employ manual therapy to increase ROM, decrease pain and improve function.

After we have worked on ROM the athlete will start a rehab program that works to improve strength and proprioception. At the Tennessee Titans, we also incorporate core/trunk stabilisation exercises with all rehab programs. Lower extremity programs typically start with non weight-bearing and two-legged exercises, then progress to weight-bearing and single-leg exercises. During the program we are constantly trying to challenge the athlete by changing the external stimulus.

When a player has a substantial injury during the season, often it is challenging to design a rehab program that will allow the player to return before the season is over. Physical therapists in the NFL walk a thin line during the rehab process: on one hand, we are constantly pushing the envelope every day to progress the player but, on the other hand, we must respect the physiological healing that is taking place in the body.

We are often up against unusual demands and timeframes for returning players. An example of this is when a player has an isolated MCL sprain. Depending on the severity of injury — and the player's position — it is not uncommon for players to miss minimal amounts of time. We have had offensive linemen miss no games with grade two to three MCL sprains. Obviously, the ligament has not had a chance to heal in one week, so it is our job to design a program that will restore knee ROM and strength and make sure that the athlete has enough proprioception in that lower extremity to function. In this case, we will also utilise an external knee brace to help support the knee. It takes a very special, determined and hard-nosed player who plays one week after an MCL injury, but most NFL players are tough and can deal with injuries different than those sustained by the general population.

The difference between average NFL players and the superstars is their athletic ability and their ability to deal with pain and dysfunction. Because the NFL season is so long and so physical, all NFL players will have to deal with injury at one time or another and it is the sports medicine team's job to help the player recover as fast and as fully as possible and return to the field with as little deficit as possible.

An example of a generic lower extremity rehab progression when a player is doing squats is as follows:

- two-legged isometric squat,
- two-legged dynamic squat,
- two-legged dynamic squat with resistance (sports cord),
- two-legged dynamic squat on an uneven surface,
- single-leg isometric squat,
- single-leg dynamic squat,
- single-leg dynamic squat on even surface,
- single-leg dynamic squat on uneven surface with resistance (sports cord).

The Tennessee Titans' rehab programs incorporate as many functional exercises as possible. It is important to strengthen muscle and joints independently but ultimately these muscles and joints must all work together and be able to function together.

As soon as the athlete can start functional and sport specific exercises we start to incorporate these into their programs.

We base the progressions of our rehab programmes on three factors:

- First is physiological healing. We do not want to exceed the amount of stress the tissue can handle and either damage the repair or slow down the healing response.
- The second factor is the physician's orders. We have a very close relationship with our team physicians and often they let us

» *Continued on page 28*

Negligent medical care of players: Who's responsible?

by Hayden Opie

Hayden Opie, Director of Studies, Sports Law Programme, in the Faculty of Law at The University of Melbourne, who reports on an interesting court case for health professionals which was decided in England just before Christmas 2005.

The case was West Bromwich Albion Football Club Ltd v El-Safty [2005] EWHC 2866 (QB) (14 December (2005) http://www.bailii.org/ew/cases/EWHC/QB/2005/2866.html.

The court decided that a consultant orthopaedic surgeon was not liable to the English Premier Club whose player he treated.

The player had suffered an injury to his right PCL. The recommended surgery proved unsuccessful. The player did not fully recover and was forced to retire. The advice that the knee should be reconstructed was admitted to be negligent. Conservative treatment should have been preferred, probably resulting in recovery in about four months. Although it is not stated in the court's judgment, it might be surmised that the club was contractually obliged to continue at least some payments to the player for the remaining 1½ years of his contract and the recovery of such wasted payments was at the heart of its claim against the surgeon. The court referred to the club's loss as being "potentially several million pounds".

No contract

The surgeon was not an official "team doctor"; just the "first choice orthopaedic consultant". The case turned on whether or not in the circumstances there was a contract between the surgeon and the club. The court held no contract, notwithstanding that:

- the surgeon had seen about 34 patients from West Bromwich Albion (WBA) in the five years to 2002;
- accounts were sent to WBA which in most cases arranged for payment by its medical insurer (some it paid itself when it was not insured);
- the club physiotherapist arranged all appointments and attended with the players; and
- the surgeon would send a written report to the club doctor.

The factors which led the court to decide there was no contract between the club and the surgeon were that:

- there was no written or other clear record of a contract, let alone a contractual term by which the surgeon accepted liability for the "loss of asset value of a player";
- the physiotherapist regarded the circumstances as a referral by one health professional to another and there was nothing said between them suggesting that the referral was on behalf of the club;
- the surgeon was strongly of the view that he should not enter into any contractual relationship with the club because of the potential for conflict of interest -- a potential whose existence the court accepted;
- the surgeon believed that his duty was to the player as patient, not the club, and that the operation would go ahead only with the player's consent; and
- payment by the club was only a "convenient mechanism to collect the fees" and the product of the contractual arrangements between club and player whereby the club undertook to pay for medical treatment necessitated by playing injuries.

There was also a claim in the tort of negligence for breach of duty of care owed to the club by the surgeon. This was rejected for a number of reasons.

Although the test for deciding the existence of a duty of care in England is different from that in Australia, the High Court of Australia would probably reach a similar conclusion of no duty to the club (although clearly a duty to the player as patient exists).

Imposing a duty

As part of the test applying in England, the court must ask whether it would be "fair, just and equitable" to impose a duty. To this the court said "Should a consultant for example advising a Rooney or a Beckham or a Flintoff have a potential tortious liability to their club/country or England for negligent treatment - a liability running into many millions of pounds?...Should the consultant take steps to ascertain their value so as to evaluate his potential liability? Should he seek to put in hand a disclaimer or limitation of his liability? How would he do this? How would insurance premiums be affected?"

The court concluded that it would not be just, fair or equitable to impose such responsibility.

The lesson is for clubs to be very clear on their relationship with consultant surgeons and physicians who are not the team doctors - and for such people to be very clear about to whom they are responsible especially when the club is financing the treatment.

Obtaining legal advice on individual circumstances is recommended.**SH**

Comings, goings, happenings

Sports Medicine Australia will be making a submission to a forthcoming inquiry by the Senate Environment, Communications, Information Technology and the Arts Committee into women in sport and recreation in Australia, and is soliciting contributions to the submission from SMA members.

The Committee's closing date for submissions is 16 June, so members should get their thoughts or comments on the issue into CEO Gary Moorhead at smanat@sma.org.au by 9 June at the latest.

These are the inquiry's Terms of Reference:

The Senate has referred the following matter to the Committee for inquiry and report by the first sitting day in September 2006, with particular regard to:

a. the health benefits of women participating in sport and recreation activities;

b. the accessibility for women of all ages to participate in organised sport, fitness and recreation activities, with additional reference to state and federal programs, including;

   i. the number of women actively participating in organised sport, fitness and recreation activities;

   ii. characteristics of women not participating in organised sport, fitness and recreation activities (including , for example, socio-economic strata, age, women with a disability, Indigenous or Culturally and Linguistically Diverse (CALD) women);

   iii. constraints, including strategies to overcome the constraints that may prevent these women from participating;

   iv. the effectiveness of current state and federal grant programs that encourage women to participate;

   v. the retention and attrition trends of grass roots participation, including comparisons with male athletes at a similar level;

   vi. the remuneration, recruitment, retention and attrition of elite female athletes, including comparisons with elite male athletes;

   vii. retention of athletes competing in senior and open age state and national sporting competitions, with possible strategies to retain female competitors in elite and sub-elite competition;

   viii. opportunities and barriers for national team members and competitors in international competition;and

   ix. the financial status, success and viability of women's national league competitions, including strategies to improve these factors;

c. the portrayal of women's sport in the media, including:

   i. the role of the government to regulate and review the coverage of women's sport in the media (print, radio and electronic);

   ii. the influence of pay television on the coverage of women in sport;

   iii. the promotion and publicity of women's National League competitions,

   iv. the financial status and success of women's national leagues.

   v. strategies to improve the amount and quality of media coverage for women's sport;

d. women in leadership roles in sport, including;

   i. the number and proportion of women in coaching, administrative and officiating roles;

   ii. the issues associated with women in leadership roles in both elite and grass-roots activities;

   iii. trends and issues for women in organisational leadership roles; and

   iv. strategies to improve the numbers of women in coaching, administration and technical roles.

Non-SMA-member readers of Sport Health who want to lodge submissions to the inquiry can find the Committee's contact and other details at www.aph.gov.au/Senate/committee/ecita_ctte/womeninsport/tor.htm.

* * * * *

There's been lots of movement in and out of SMA National Office lately:

- Joyce McClune retired in May after 12 years of cheerful service to SMA and our members. Joyce's title was Membership Officer but she also managed our publications subscriptions and – more importantly – was a walking storehouse of information and advice about SMA and its recent history as a national organisation. Her place is taken by Jenny Donaldson (jenny.donaldson@sma.org.au).
- Safer Sport Program Coordinator Dominic Feenan and Safer Sport Administrator Stewart Priddis have moved on: Dom to the Australian Federal Police in Canberra and Stewart to Sydney and SMA NSW. Safer Sport Coordination will be shared by Emma Sullivan (emma.sullivan@sma.org.au) and Nathan Kruger (nathan.kruger@sma.org.au).
- Angela Cox, our Conference Manager, has returned to her home base in Melbourne. Davina Sanders (davina.sanders@sma.org.au) has taken over as Conference Manager.

* * * * *

SMA WA's Directory for Western Australia is now available. The Directory contains a wealth of information about available sports medicine, education and other services by SMA members around the State and SMA WA Branch.

Details from SMA WA at www.smawa.asn.au.

Conferences in 2006

Plans are well advanced for some seriously high quality sports medicine and sports science conferences this year.

First and foremost of course is ACSMS – the ASICS Conference of Science and Medicine in Sport, which goes offshore this year.

The 2006 Conference is from 19-21 October at the Shangri-La Fijian Resort at Yanuka in Fiji.

Speakers include Dr Tim Olds (Director of the Centre for Applied Anthropometry at the University of South Australia), Professor Stephan Rössner (of the Karolinska Institute in Stockholm), Professor Peter Fricker (Director of the Australian Institute of Sport), Dr Andrew Pipe (University of Ottawa and, among other things, President of the Canadian Commonwealth games Federation and Chair of the Canadian Doping Control Review Board)Professor Peter McNair (Director of the Physical Rehabilitation Research centre at Auckland University of Technology), Professor Wendy brown (The University of Queensland), Dr Jill Cook (LaTrobe University) and Dr Simon Bartold (????????).

Conference symposia will include

Diabetes: Causes and Countermeasures, dealing with the role of sports medicine practitioners and health professionals in preventing diabetes,

Reflections from the Other Side, in which practitioners turned administrators reflect on the perspectives their changed positions give them of clinical practice, and

Best of the Best, where the winning presenters of Best Paper compete in re-presentations for the Asics Medal and Best paper Overall prize.

Trade exhibitors include some of the big names in sport health and sport medicine: eg, Asics, Beiersdorf, Biocel, Elsevier, HF Industry, Kinetic Orthotics, Thermoskin and BJSM. There are still some vacancies for trade exhibitors – but sports are going fast.

Social program includes the Conference Gala Dinner, the welcome reception and poster drinks – and plenty of swimming, snorkelling, etc.

The New South Wales Conference on Science and Medicine in Sport takes place at Raffertys Resort at Lake Macquarie on 6 May.

Major topics will include physical activity and children's health, medicine in sport and exercise and sports orthopaedics. Keynote speakers include Professor George Murrell and Associate Professor Geraldine Naughton.

Contact information from SMA NSW at 02-9660-4333 or admin@smansw.com.au.

And the 8th Australian Injury Prevention and Control Conference is on at The University of New South Wales in Sydney over 27-29 September.

The conference theme "Working Together" will focus on injury prevention with a multidisciplinary perspective.

Contact information from Maria Lamari at the Conference Secretariat on 0417-003-329 or secretariat@aipn.com.au.

For your

Functional Anatomy of the Spine (2nd Ed)

A Middleton, J Oliver
ISBN 0 750 62717 4

Published by Butterworth Heineman, distributed by Elsevier

The 2nd edition has been updated, with new 2-colour illustrations, with new information on such issues as the biomechanics of the nervous system, cervical disks, vertebral artery and blood supply and the mechanics of the upper cervical spine, and coverage of new theories on thoracic biomechanics.

Mosby's Dictionary of Medicine, Nursing and Health Professionals – Australia/New Zealand Edition

P Harris, S Nagy, N Vardaxis (Eds)
ISBN 0 7295 3754 4

Published by Elsevier/Mosby

This Australian-New Zealand version (weighing in at about 2.65 kg) of the US-published Mosby Dictionary is claimed to be the first comprehensive dictionary for medicine, nursing and health professionals in our region. Its 2134 pages include appendices on the health of Aboriginal and Torres Strait Island and Maori people, health organisations and resources and infection control. It contains a tabular atlas of human anatomy and physiology and a CD containing nursing diagnoses and definitions from Activity Intolerance to Wheelchair Use Problems.

library

Sport and Exercise for Pharmacists

SB Kaye (Ed)
ISBN 0 85369 600 4

Published by the Pharmaceutical Press (UK)

As the title says, this is intended for pharmacists but also for other healthcare professionals: an introduction – as more people are taking to physical activity – to preventing and treating injuries in sport and exercise.

Clinical Sports Nutrition

L Burke and V Dean (Eds)
ISBN 0 074 71602 6

Published by McGraw-Hill

This 3rd edition includes updates in the positions and consensus viewpoints of such international organizations as the International Olympic Committee and the American College of Sports Medicine. New contributions include commentaries on the antioxidant needs of athletes, the Female Athlete Triad and nutritional strategies for reducing the risk of illness in athletes. Other topics include nutritional assessment of athletes, measuring physique, weight loss and weight making, post-exercise recovery, iron depletion, micronutrient needs, supplements and sports foods, and eating disorders in athletes.

BTB operative protocol

» *Continued from page 15*

- Bone graft (including the bone core) is inserted into the patellar and tibial defects.
- The patellar tendon is then closed with 2/0 Vicryl.
- The wound is closed over a suction drain.
- 10 mL of 0.25% Marcain is instilled into the joint and around the portals.
- Subcutaneous 2/0 Vicryl.
- Subcuticular Monocryl skin closure.
- Wool and crepe dressing.
- Hinged knee brace locked to allow flexion from 0° to 90°.

Post-operative Rehabilitation

- Patients begin weight-bearing on crutches immediately.
- Simple analgesics for pain control.
- Usual time in hospital is two nights.
- A hinged brace is advised for approximately two weeks, but longer with generalised ligamentous laxity.
- Daily physiotherapy to reduce postoperative swelling and to allow active exercises aiming for full extension by 14 days.
- Review at 10 to 14 days for wound inspection and suture removal.
- Further review at six weeks, six months and then yearly.
- Intensive rehabilitation program including closed-chain exercises and an emphasis on proprioceptive re-training.
- The Dr Cross protocol is available on request or online at www.kneeclinic.com.au for the treating physiotherapist and physician.
- At six weeks, patients begin jogging in straight lines, swimming and using a bicycle.
- From 12 weeks general strengthening exercises are continued with agility work and sporting activities encouraged.
- Return to competitive sport involving jumping, pivoting or sidestepping is prohibited until six months after the reconstruction.

Complications

- Patella fracture.
- Chronic patellofemoral pain – kneeling pain.
- Patella tendon rupture.
- Patella tendonopathy and calcification.
- Graft fixation screws prominence.
- Graft failure.
- Stiffness – and Cyclops lesions preventing full extension.
- Cysts of the ACL.
- General complications; infection, DVT, haemarthrosis, nerve injury, complex regional pain syndrome (CRPS or RSD).

SH

Mouthgards in sport

» *Continued from page 17*

Independent research

Finally, the following statement by the Institute is untrue: "Very little independent research has been done into whether custom-fitted mouthguards offer more-effective protection than boil-and-bites. One of the few studies that compared them found no difference in dental injuries between players wearing custom-fitted or boil-and-bite mouthguards - although the sample was fairly small." "

In fact, published research[2,13,18,19] shows the vastly superior protection provided by custom-fitted mouthguards vs. boil-and-bite or self-made mouthguards. The review refers to the study with a "fairly small" sample, but doesn't identify it. Although the sample was small, it is an interesting finding. Why has it not been described and cited in other published studies?

Can the institute's recommendations be taken seriously?

Definitely not!

The premise that boil-and-bite mouthguards offer an appropriate, cost-effective alternative to custom-fitted mouthguards is not acceptable.

The publication of step-by-step instructions on fitting these self-form devices is not only irresponsible but gives credibility to these devices which they don't deserve.

The review has ignored the well-documented shortcomings of self-fit guards, as well as the concerns of its own experts whose message is clear and unambiguous.

Dental injury is not eliminated by wearing a mouthguard(3) . The severity of the injury can be reduced by wearing an acceptable mouthguard[2,10,16.] Custom-fitted guards are preferable to any self-fit/boil-and-bite mouthguards. Mouthguard selection should be made on the basis of impartial, accurate advice that is evidence-based. The information presented in the review by the Consumers' Institute of New Zealand is inaccurate, misleading and in some fundamental areas clearly wrong.**SH**

John Banky is a dental surgeon in Melbourne, Australia.

References:

1. Banky & McCrory. Mouthguard use in Australian football. J Sci Med Sport;2;20-9, 2;1999
2. Newsome PR, Tran DC, Cooke MS. The role of the mouthguard in the prevention of sports-related dental injuries. Int J. Pediatr Dent;11; 396-401;2001
3. Johnson & Messer. An in vitro study of the efficacy of mouthguard protection for dentalveolar injuries in deciduous and mixed dentitions. Endodontics Dental Traumatology; 12; 277-285; 1996
4. Cummins & Spears. The effect of mouthguard design on stresses in the tooth-bone complex. Med Sci Sports Exerc;34;942-947; 2002
5. Westerman, Stringfellow, Eccleston. Forces transmitted through EVA mouthguard materials of different types and thickness. Aust Dent J;40; 389-91;1995
6. Westerman, Stringfellow, Eccleston. An improved mouthguard material. Aust Dent J;42; 189-91;1997
7. Tran, Cooke, Newsome. Laboratory evaluation of mouthguard material. Dental Traumatology; 17; 260-265; 2001
8. Braham, Finch, McIntosh, McCrory. Community football players' attitudes towards protective equipment – a pre-season measure. Br J Sports Med; 38; 426-30; 2004
9. Diab, Mourino. Parental attitudes towards mouthguards. Pediatr Dent; 19;455-60;1997
10. Lieger, von Arx. Orofacial/cerebral injuries and the use of mouthguards by professional athletes in Switzerland. Dent Traumatol; 22; 1-6;2006
11. Westerman, Stringfellow, Eccleston. The effect on energy absorption of hard inserts in laminated EVA mouthguards. Aust Dent J; 45; 21-23;2000
12. Takeda, Ishigami, Handa, Naitoh, Kurokawa, Shibusawa, Nakajima, Kawamurra. Does hard insertion and space improve shock absorption ability of mouthguard. Dent Traumatol; 22; 77-82; 2006
13. Guevarra, Hondrum, Reichl. A comparison of commercially available mouthguards and a custom mouthguard. General Dentistry; 49; 402-406; 2001
14. Oikarinen & Salonen. Introduction to four custom-made mouth protectors constructed of single and double layers for activists in contact sports. Endodontics Dental Traumatology; 9; 19-24;1993
15. The International Academy for Sports Dentistry. Position Statement for "A Properly Fitted Mouthguard. 6 December 1998
16. Takeda, Ishigami, Ogawa, Nakajlima, Shibusawa, Shimada, Regner. Are all mouthguards the same and safe to use? The influence of occlusal supporting mouthguards in decreasing bone distortion and fractures. Dental Traumatology;20;150-156; 2004
17. Takeda, Ishigami, Ogawa, Nakajlima, Shibusawa, Shimada, Regner. Can mouthguards prevent mandibular bone fractures and concussions? A laboratory study with an artificial skull model. Dental Traumatology; 21;134-140;2005
18. Finch, Braham, McIntosh, McCrory, Wolfe. Should football players wear custom fitted mouthguards? Results from a group randomised controlled trial. Inj Prev; 11; 242-246; 2005
19. Deyoung, Robinson,Godwin. Comparing comfort and wearability: Custom-made vs. Self-adapted mouthguards. JADA; 125; 1112-1117;1994

Whatever it takes

» *Continued from page 23*

progress the players as much as the player can tolerate.

- The third and final factor is the athlete's response to the injury and the rehab program. Our athletes are evaluated and re-evaluated every day, and often multiple times a day. We change our rehab programs to accommodate a change in the player's status.

The most important points when designing rehab programs for NFL players are:

- know the player and know the injury,
- understand the physiological healing response and how it changes day by day and week by week,
- communicate with the player, physician and other members of the healthcare team,
- challenge the player during every rehab session,
- be creative and thorough with your rehab programs,
- understand the proper rehab progressions and incorporate core/trunk exercises to all extremity programs, and
- all programs should be functional and incorporate proprioception exercises.

Geoffrey Kaplan is in his eleventh season as the Titans' Assistant Athletic Trainer. He was certified as a clinical specialist in sports physical therapy by the American Board of Physical Therapy Specialties in 2005.**SH**

This article was first published in SportsPhysio, the official quarterly magazine of Sports Physiotherapy Australia. To subscribe to the magazine, email spa@physiotherapy.asn.au. For more information about physiotherapy, or to find a physio, go to the Australian Physiotherapy Association website www.physiotherapy.asn.au.