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Contents

Race control

Welcome to the sixth edition of volume 2 of the ASMMR newsletter. There has been a bit of a break between issues, but we are back on track (no pun intended … Oh, of course it was intended). There are a fair number of Australian interests charging about over the recent months. Mark Webber is on the brink of pulling off an Australian F1 championship win in the very near future. Casey Stoner has dropped off the podium, but is only a point off the mark behind Rossi.

The Australasian Safari Rally was held at the end of September and covered 3,000 competitive kilometers over the southern parts of Western Australia, between Leonora and Esperance. The overall winner was V8 driver Craig Lowndes in a factory Holden Camaro. The rally was brutal, with broken vehicles littering the course (though all the FIVs did ultimately make it back) and the requisite biker hospital runs. Good fun!

The clinical update section examines the validity of extrapolating emergency room decision algorithms for "clearing" a potential cervical spine injury in the field and you opinions are welcome.

Good luck.

Matthew Mac Partlin

Clinical review – Pre-hospital cervical spine clearance

Cervical spine injury is a major concern in any trauma incident that involves the transmission of significant forces to the victim's body. It is a source of great anxiety for the initial rescuers and later to the trauma team providing definitive management. Almost by default, a motor vehicle trauma victim will be presumed to have a cervical spine injury, a hard collar will be applied and the person will be assessed as such at the hospital. On the surface of it, this would seem to be a reasonable and appropriately cautious approach. However, as with any intervention, the prophylactic application of a hard collar is not entirely benign. To begin with, they are uncomfortable to wear. More importantly, if left in place for a longer duration, they have the potential to cause significant pressure ulcers, particularly over the occipital prominence, the chin and the suprascapular region. There are documented cases of hard collar induced pressure necrosis requiring appreciable plastic surgery[1].

Furthermore, once labeled as a potential cervical spine injury, a patient is typically subjected to a number of additional investigations, resulting in:

- a prolonged time spent with the collar in place
- being left for an inappropriately long duration on a hard spine board with all of its attendant complications
- the need for the patient to be log rolled, resulting in problems if the patient vomits, or committing a patient to urinary catheterisation due to the difficulty voiding their bladder while adopting spinal precautions
- exposure to radiation in an attempt to image potential injury. With the possibility of litigation and its increasing availability, there has been a steady rise in the use of CT to exclude cervical injury. CT is not the best modality, however, to image the tissue that we are really interested in; the spinal cord and spinal nerves, which has in turn, led to much confusion over the role and timing of MRI in trauma.

Additionally, the benefit of spinal imobilisation itself has been called into question by a 1998 trial that suggested that where the initial mechanism had resulted in spinal fracture but had not produced a spinal cord injury, subsequent careful handling without the use of formal immobilisation equipment was unlikely to do so[2].

Several groups of investigators have tried to standardise the role of imaging in suspected traumatic cervical spine injury. The two most notable groups are Jerry Hoffman's NEXUS group[3] and Stiell et al's Canadian C-spine rules (CCR)[4]. Both groups validated a set of clinical decision rules, or algorithms, for determining which patients with blunt cervical trauma required imaging and which could be "cleared" clinically. Both were large, prospective, multicentre trials and reported sensitivities of 99% (NEXUS) and 100% (CCR) and specificities of 12.9% (NEXUS) and 42.5% (CCR), indicating that they would be good screening tools to exclude (rule-out) significant cervical injury, though fairly poor diagnostic (rule-in) tools. Hoffman's group's NEXUS tool is much easier to use, consisting of 5 criteria (Table 1), which if met reduced the need for imaging to exclude cervical spine injury. However, it was also criticised for the wide inter-rater variability of the fourth and fifth criteria particularly, as there is potential for a large difference in interpretation of their presence or absence.

Table 1. - The NEXUS criteria

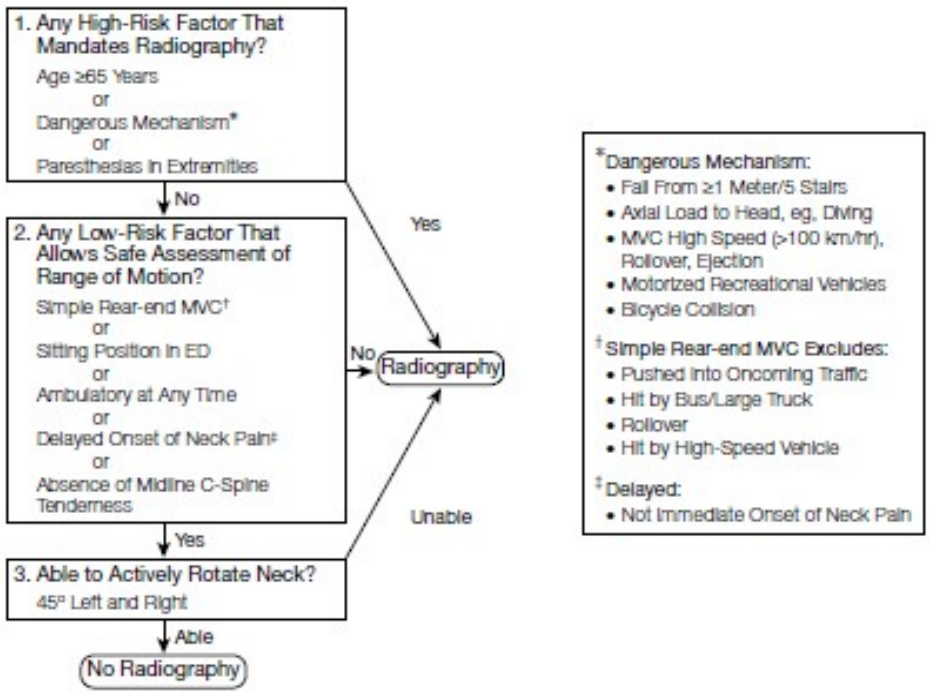
- No tenderness at the posterior midline of the cervical spine
- No focal neurologic deficit

- Normal level of alertness
- No evidence of intoxication
- No clinically apparent, painful injury that might distract from the pain of a cervical spine injury

Absence of <u>all</u> 5 of these criteria allowed clinical clearance of the cervical spine from *clinically significant* injury and obviated the need for imaging.

The Canadian C-spine rules (CCR) produced a more comprehensive algorithm that most clinical practicioners agree with, but find difficult to remember due to their relative complexity (Figure 1).

Figure 1. - The Canadian C-spine rules



However, there are several important issues to consider with these two systems. First and foremost, neither one is adequately specific to diagnose cervical injury and neither one excludes all forms of cervical spine injury. They rely on the fact that no patient who met their criteria had a "clinically significant injury" detected on subsequent imaging; i.e. that any injuries that were found required no further intervention. The conclusion of both trials is similar, stating that their study serves to reduce the need for performing cervical spine imaging. They are effectively cost-saving radiation-reduction trials, with an implied reduction in the presence of significant cervical injury.

Importantly, for our cohort of patients, both of these studies were conducted in hospitals, albeit a broad range in Hoffman's trial. As we operate in the pre-hospital environment, the validity of these results may not be applicable to our patients. Indeed, the Trauma.org guidelines state that "there is no conclusive evidence in the literature that supports clinical clearance of the spine in the prehospital environment. There is enough variation between prehospital and in-hospital assessments to recommend that prehospital removal of spinal immobilisation be avoided.[5]"

There have been attempts to validate pre-hospital clinical descision tools for the clearance of the cervical spine at the scene. The bulk of pre-hospital studies in this area are authored by an American emergency physician called Robert Domeier at Ann Arbor in Michigan. He has documented a high prevalence of at least one of the NEXUS criteria among pre-hospital trauma patients with cervical (100%), thoracic (99%) and lumbar (97%) spinal cord injuries[6]. He has since conducted several prospective trials to examine the management of possible spinal injury in the pre-hospital trauma population[7,8]. The 2002 trial was a large (8,975 patients) multicentre, prospective, observational trial that assessed 5 spinal injury clearance criteria across a broad range of basic, advanced and air ambulance services catering for metropolitan, regional and rural hospitals. The injury clearance criteria were essentially the same as NEXUS, except for the substitution of suspected significant extremity fracture or dislocation for distracting painful injury. All ages were included and any form of trauma was considered as long as some form of spinal imobilisation was used. The majority of injury mechanisms were accounted for by motor vehicle collisions and falls. Only primary transports were included. The ambulance personnel were instructed to carry out their usual protocol of care, but were to complete a standardised form, based on their initial evaluation, which included the mechanism of injury and an assessment of the 5 spine injury clearance criteria. The medical records of all eligible patients were subsequently examined by a designated physician or nurse for the diagnosis of a spinal cord injury or cervical, thoracic or lumbar, but not sacral, spine fracture.

Of the 8,975 patients included in the study, 3,141 (35%) imobilised patients were shown to ultimately have had no spinal injury and 295 were subsequently shown to have sustained a spinal cord injury or spine fracture, the most common of which was a cervical spine fracture (103 of the 295 patients). 15 of these injured patients were missed by Domeier's clearance criteria, all of whom had either a spinal fracture or dislocation, but no spinal cord injury. 13 of these 15 patients were considered not to have had unstable injuries based on not requiring more than basic imobilisation or pain control for the duration of their admission. The last 2 were found to have a clinically significant spinal injury (a C 1 and 2 fracture and a T6/7 subluxation), but were also found to have had a poorly performed clearance which would have identified them as potential injuries if the criteria had been assessed properly. None of the 15 missed patients had an adverse outcome beyond their missed injury.

Overall, where a patient was identified as having sustained a potentially significant spinal injury if they had at least one of the clearance criteria present, the sensitivity was 94.9% and the specificity was 35%, yielding a negative predictive value of 99.5%. While this looks impressive as a screening tool, it does suggest that 5 of 100 significant injuries will be missed, with the potential for devastating consequences. While the application of this decision tool might avoid unnecessary immobilisation in 35% of trauma patients, missing 5% of potentially significant injuries would still create discomfort for most practitioners. Again, the validity of this study population in comparison to ours bears consideration, as Domeier's study included all age ranges and all forms of largely civilian trauma, in contrast to 16 to 60 year olds involved in competitive motor vehicle and bike collisions with a variety of collision protection systems in place that include HANS devices and reinforced roll cages.

Based on all of the above, while it is tempting to use NEXUS and CCR type guidelines to minimise the unnecessary use of formal cervical spinal immobilisation devices in the pre-hospital environment, caution should be advised. There is still the potential for a small number of patients with a spinal injury to be missed and, although none of the patients in any of the above studies had a subsequent adverse outcome, nobody would want to be responsible for documenting the first case, especially given the possible consequences. Additionally, the complications of cervical hard collars

are largely related to improper placement and prolonged duration of use. So it would seem prudent to have a low threshold for appropriate spinal immobilisation in the field and then leave it to the receiving emergency department to assess these patients and dispense with their hard collars when appropriate as soon as is practical.

References

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Recent race results

Formula 1

So, we are drawing to the end of the season and things are still interesting; which makes a nice change. Every race still counts and there are a number of suitors. Webber is well positionned despite his attempt to re-enact his 24Hour LeMans flip, with the aid of Heiki Kovaleinen’s Lotus. He landed on his roll-bar and rolled on to his wheels, sliding straight into the tyre wall at Valencia’s turn 12 at a smidge under 300kph. I wonder if he had read the previous edition of the ASMMR newsletter. Fortunately, he was able to climb out unassisted and take a ride in the medical car.

Hamilton seems to be competing in a demolition derby and frustration might be setting in. Vettel and Alonso are still threats. So it's on to Korea, where some Australians are helping out with the event. (You know who you are.)

1. Mark Webber - Red Bull 220 2. Fernando Alonso - Scuderia Ferrari Marlboro 206 3. Sebastian Vettel - Red Bull 206 4. Lewis Hamilton - Vodafone McLaren Mercedes 192 5. Jenson Button - Vodafone McLaren Mercedes 189	6. Felipe Massa - Scuderia Ferrari Marlboro 128 7. Nico Rosberg - Mercedes GP Petronas 122 8. Robert Kubica - Renault F1 Team 114 9. Michael Schumacher - Mercedes GP Petronas 54 10. Adrian Sutil - Force India F1 Team 47	11. Rubens Barrichello - AT&T Williams 41 12. Kamui Kobayashi – BMW Sauber-Ferrari 27 13. Vitaly Petrov - Renault F1 14. Nico Hulkenberg – Williams-Cosworth 17 15. Vitantonio Liuzzi - Force India F1 Team 13

Next race: Yeongam International Circuit, Korea 25th October.

World Rally Championship

For anyone who watched the New Zealand Rally … what an event! If you missed it, you missed one of the most phenomenal comeback drives in a professional rally event. Loeb truly is a master rally pilot. However, you also missed a race where even the best got caught out several times and the lead on the final day changed hands with every stage, right down to the final time point. It was great and a well earned win for Jari-Matti. A great drive from Ogier was undone in the final stages when the pressure started to get to him. Unfortunately it also put Hirvonen's performance in a less glowing light, having lost less time than Loeb on the first day, but never really climbing back up the order.

In Portugal, Ogier claimed the win that has been coming and it was a good one. However, no one could prevent what ultimately proved inevitable – Sebastian Loeb is once again crowned the world champion, with a 60 point lead and only 50 left in the competition; his seventh consecutive title. Despite looking shaky at a few of this year's events and exposing previously unseen chinks, he has proven his dominance of this form of motorsport. There is still a fight left for second between a maturing Latvala, a Petter Solberg privateer comeback and a thoroughly impressive Ogier, with only 30 points between them.

One final note: Phil Mills, Petter Solberg's long time navigator, who suddenly quit the WRC trail earlier this year, leaving Solberg to find a replacement before Bulgaria, has recently competed as a co-driver in a local Welsh event. You can't ever completely walk away.

1. Sebastien Loeb 226 2. Sebastien Ogier 166 3. Jari-Matti Latvala 144 4. Petter Solberg 133	5. Dani Sordo 4125 6. Mikko Hirvonen 104 7. Matthew Wilson 60 8. Federico Villagra 36	9. Henning Solberg 33 10. Kimi Raikonen 21 11. Mads Ostberg 16 12. Per Andersson 8

Next event: Rally de Espana, 22nd - 24th October 2010

V8 Supercars

Bathurst provided its expected show. Crowd numbers were up, so it looks like the promoters are doing their job well. Lowndes and Skaife, the modern(ish)-day golden boys of V8 racing pulled off a great victory, with little more than fumes in their tank. Perhaps Craig's larking about in a Holden factory ute for the 2010 Australasian Safari in WA two weeks ago taught him a few tips. Fabian Coulthard provided the issue's Caught by the Cameras shot, for the princely sum of $1.50 (See later).

1. James Courtney 2323	6. Shane van Gisbergen 1773	12. Jason Richards 1391
	7. Rick Kelly 1688	13. Russell Ingall 1301
2. Jamie Whincup 2198	8. Lee Holdsworth 1631	14. Jonathon Webb 1285
3. Craig Lowndes 2039	9. Michael Caruso 1524	15. Tim Slade 1244
4. Mark Winterbottom 2030	10. Paul Dumbrell 1440	16. Jason Bright 1123
5. Garth Tander 1938	11. Steven Johnson 1412	17. Todd Kelly 1062

Next round: SuperGP, Surfers Paradise, 21st – 24th October

MotoGP

Even taking a mid-season break for a broken leg, Rossi has clawed his way back on to the podium and currently sits in third spot in the rankings. Another motorsport dominator. However, Stoner and Dovizioso are only a point each behind him. Meanwhile Jorge is relishing his release and is paying back the confidence in spades.

1. Jorge Lorenzo - Fiat Yamaha Team 313	6. Ben Spies - Monster Yamaha Tech 3 152	11. Colin Edwards - Monster Yamaha Tech 3 81
2. Dani Pedrosa - Repsol Honda Team 228	7. Nicky Hayden - Ducati Marlboro Team 139	12. Hector Barbera - Aspar Racing Team 74
3. Valentino Rossi - Fiat Yamaha Team 181	8. Randy de Puniet - LCR Honda 94	13. Alvaro Bautista - 69
4. Casey Stoner - Ducati Marlboro Team 180	9. Marco Simoncelli - San Carlo Honda Gresini 92	14. Alex Espargaro, Pramac Racing Team 52
5. Andrea Dovizioso - Repsol Honda Team 179	10. Marco Melandri - San Carlo Honda Gresini 86	15. Hiroshi Aoyama - Interwetten Honda MotoGP
		18Mika Kallio - Pramac Racing Team 20

Next round: Estoril, Portugal, 31st October 2010.

Intercontinental Rally Challenge

After 11 rounds, with only one to go.

1. Juho Hanninen 70 2. Jan Kopecky 50 3. Freddy Loix 36 4. Kris Meeke 33 5. Bruno Magalhaes 30	6 Guy Wilks 27 7 Paolo Andreucci 18 8 Andreas Mikkelsen 13 9. Thierry Neuville 12 10 Mikko Hirvonen 10	11. Pavel Valousek 6 12. Nicolas Vouilloz 6 13. Bernd Casier 5 14. Miguel Nunes 5 15. Gabriel Pozzo 5 16. Stéphane Sarrazin 5

Next event: FX Pro Cypress Rally, 4th to 6th November 2010.

Worldwide motorsport update

● Jean Todt has piped up in his role, expressing his ideas (plans) that WRC events should be longer, getting back to their endurance roots, though the price would be fewer events in the season. Whether this could mean events being dropped from the calendar altogether, or extending to a 3 year cycle has not yet been brought up.
● Ford have released images of their Fiesta RS 2000 WRC car for the 2011 season. The drivers seem happy with them. They will have a shorter wheel base than the current WRC cars and a normally aspirated turbo engine.

Caught by the cameras

This month's "Caught by the cameras" comes courtesy of a $1.50 tyre nozzle on Fabian Coulthard's car, that was damaged in a collision, resulting in almost anihilation of the $600,000 machine. Coulthard walked away unscathed, but very, very shaken. And probably a little dizzy. Nice shot of the rollcage structure!


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