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Headaches in athletes

Introduction

HEADACHES are common in both adults and children. The WHO estimates that globally, 50-75% of adults aged 18-65 have had a headache in the past year.[1] At least 30% of these have been migraines. Between 1.7% and 4% of the world's adult population have headaches on 15 or more days every month.[1]

Headaches can be classified as primary headaches (migraine, tension-type headache, trigeminal autonomic cephalalgias, other); secondary headaches (trauma, vascular, non-vascular, substance/withdrawal, infection, psychiatric disorder); or neuropathies and facial pains. Other primary headache disorders include: cough headache; exercise headache; headache associated with sexual activity; thunderclap headache; cold-stimulus headache; external pressure headache; and stabbing headache.[2]

Using these classifications as a conceptual framework for approaching the diagnosis of headache is useful, especially when ruling out causes of secondary headache disorders before diagnosing a primary headache disorder.[2]

Tension-type headaches are the most common type of primary headache, with prevalence ranging from 31-74%.[3] Their pathophysiology is poorly understood, although it is thought these may exist on a continuum with migraine. This is because they can demonstrate similar symptoms (throbbing pain, unilateral, aggravated by activity, triggered by stress), and have similar grey matter abnormalities on brain MRI. Electrographic studies have also revealed no correlation between headache severity and muscle tension, making it less likely that this is the cause of such headaches. They are usually responsive to abortive medication, such as paracetamol and NSAIDs.[3]

Trigeminal autonomic cephalalgias are characterised by trigeminal and parasympathetic activation, with lacrimation and nasal congestion as primary features. There are four distinct disorders: cluster headache, hemicrania continua, paroxysmal hemicrania, and short-lasting unilateral neuralgiform headaches

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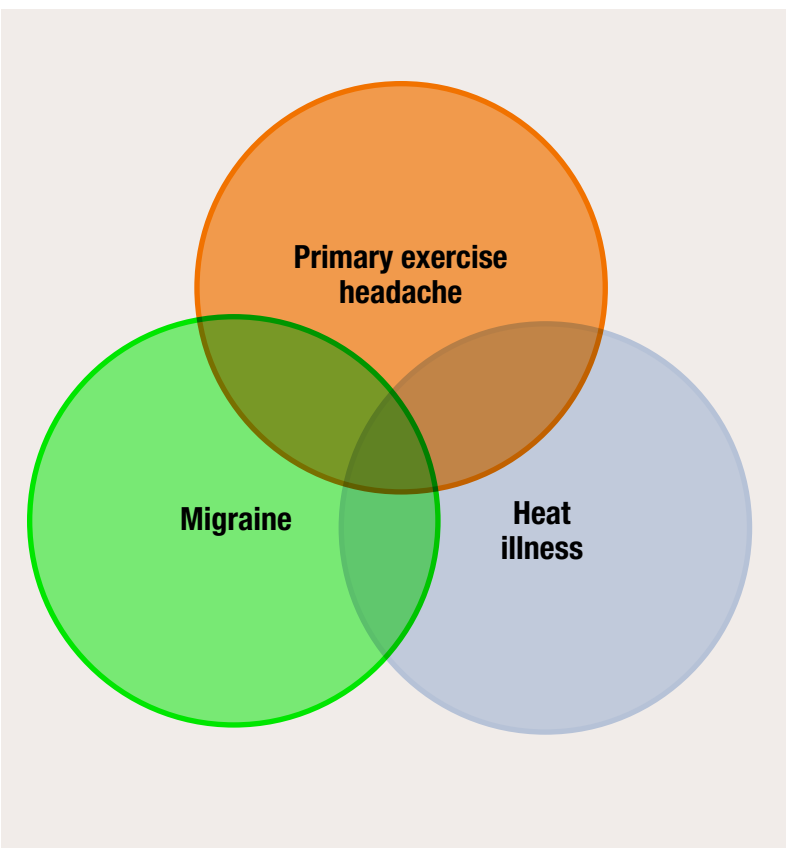

Figure 1. The relationship between coexisting aetiologies of headaches in athletes.

INSIDE

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with conjunctival injection and tearing.[3] They each have their own presentation and characteristics, and are not discussed further in this How to Treat.

When assessing headaches in athletes, it is important to consider both headache disorders that are common in the general population and causes of headaches to which athletes are more susceptible. Common headache disorders are described in table 1.

Diagnosis of a headache is easy to make, determining its aetiology can be more challenging. Figure 1 illustrates the coexistence of common causes in athletes. When considering the aetiology of headache, it is incumbent on the treating physician to recognise 'red-flag' symptoms (see box 1) as these require further, urgent investigation.

Figure 2 illustrates a clinical approach to headache diagnosis and first-line treatment. It is important to clinically differentiate the origin of the headache (musculoskeletal, vascular, other) as first-line therapy for each category is different. Second-line treatments often overlap between categories. This is because of the coexistence of headache syndromes, as illustrated in figure 1.

This How to Treat aims to describe common and not-to-be-missed headaches in athletes in long duration sports (for example, running, Australian Rules Football, other football codes). Other exercise-induced headaches, such as acute effort migraine, weight-lifter's headache, diver's headaches and raised intracranial/intrathoracic pressure headaches, are also briefly mentioned.

Table 1. Common headache disorders

Common	Uncommon		
	Pitfalls/often missed	**Masquerades**	**Serious and not to be missed**
• Headache associated with viral illness (eg, respiratory infection, sinusitis, influenza) • Vascular headaches (eg, migraine, cluster headache) • Cervical headache (eg, referred from joints, muscles, and fascia of the cervical region) • Tension headache or muscle contraction headache	• Primary exertional headache • Cervical spondylosis • Dental disorders • Refractive errors of eye • Sinusitis • Ophthalmic herpes zoster (pre-eruption) • Exertional headache • Hypoglycaemia • Post-traumatic headache • Post-spinal procedure (eg, epidural, lumbar puncture) • Sleep apnoea • Psychogenic	• Depression • Diabetes • Drugs • Anaemia • Thyroid/endocrine disorder • Spinal dysfunction (cervicogenic) • UTI	• Cardiovascular —Subarachnoid haemorrhage —Intracranial haemorrhage —Carotid or vertebral artery dissection —Temporal arteritis — Cerebral venous thrombosis • Neoplasia — Cerebral tumour — Pituitary tumour — Metastases • Severe infections — Meningitis, especially fungal — Encephalitis — Intracranial abscess • Haematoma extradural/subdural • Glaucoma • Benign intracranial hypertension

Source: Brukner P[4], Murtagh J[5]

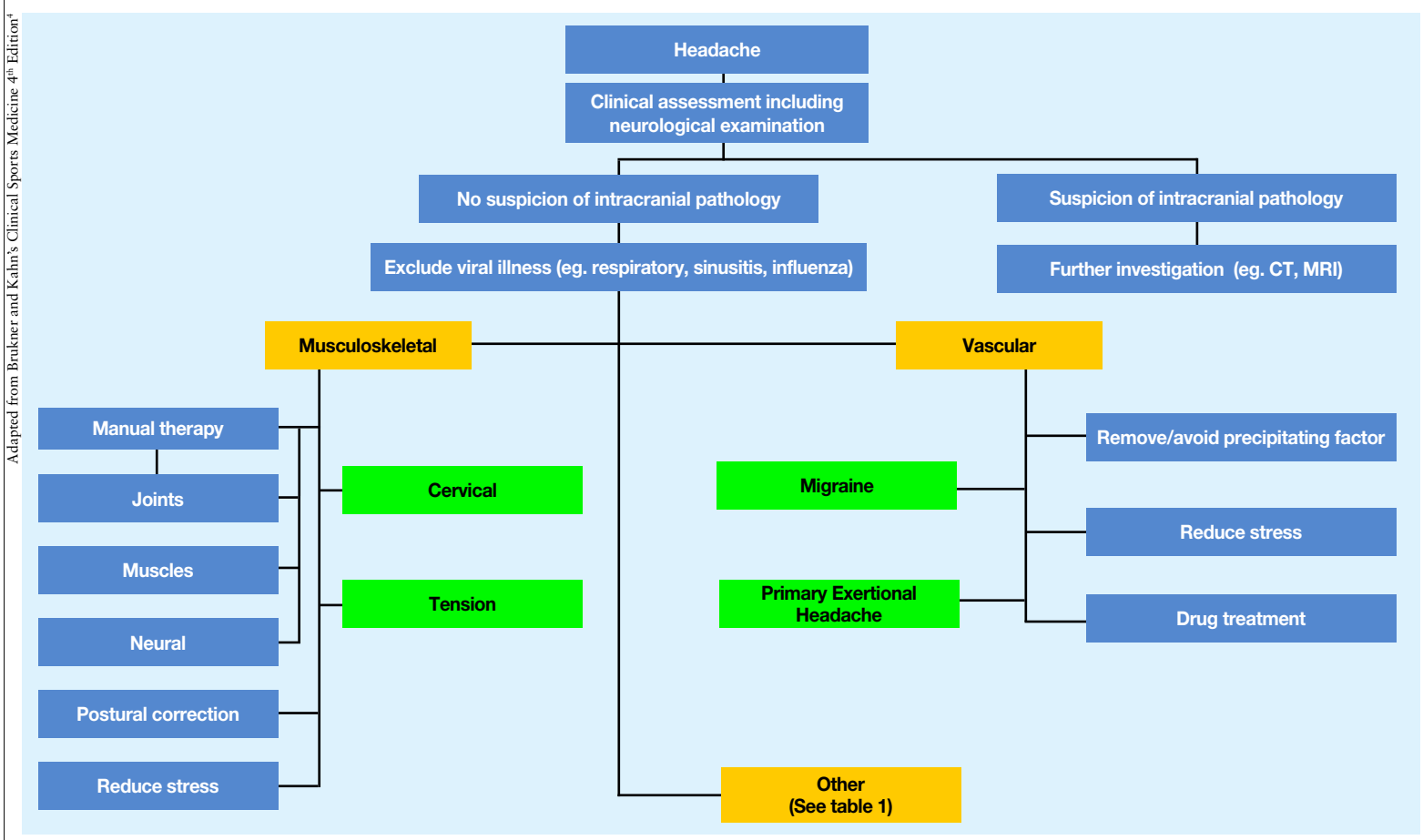

Figure 2. Clinical approach to the patient with headache.

Box 1. Headache red flag symptoms

- New or unaccustomed headache
- Atypical headache
- Stiff neck or meningeal signs
- Systemic symptoms (eg, fever, weight loss, malaise)
- Neurological symptoms (eg, drowsiness, weakness, numbness of limbs, localising neurological signs)
- Local extracranial symptoms (eg, ear, sinus, teeth)
- Changes in the pattern of headache
- Headache increasing over a few days
- Sudden onset of severe disabling headache
- Headaches that wake the patient during the night or in the early morning
- Chronic headache with localised pain
- History of significant head trauma with or without 'lucid interval'

Adapted from Brukner and Kahn's Clinical Sports Medicine, 4th Edition.[4]

Exercise as medication

IT is increasingly recognised in Australia and worldwide that exercise has significant health benefits and can be used as a 'medication' to treat an extensive range of medical conditions. These include type 2 diabetes, cancer and mental health disorders.[6,7] Exercise is recognised as part of both primary and secondary preventive medicine for these chronic diseases, and an exercise prescription alone can obviate the need for medications in many common disorders.[6,8]

Australian Institute of Health and Welfare data from 2014-15 revealed that almost two-thirds of Australian adults were overweight or obese, and 28% of these were obese, an increase from 19% in 1995. Staggeringly, one in four children (aged 2-17) were overweight or obese. Five per cent of the burden of disease in 2011 was attributable to people being overweight or obese.[9]

With these statistics in mind, it is incumbent on medical practitioners to promote exercise to their patients and to treat exercise-associated symptoms/disorders that may deter or prevent the patient from exercising. Exercise associated headache is one such symptom.

RACGP clinical guidelines recommend adults undertake 2.5-5 hours of moderate intensity physical activity, or 1.25-2.5 hours of vigorous intensity physical activity, or a combination of these, per week.[10] The guidelines contain recommendations for initial interventions to encourage people to exercise, including face-to-face counselling and setting a pedometer target.[10]

Primary exertional headache

THE first mention of primary exercise-induced headaches (PEH) was from Hippocrates in 450BC, when he noted: "One should be able to recognise those who have headaches from gymnastic exercises or running or walking or hunting or any other unreasonable labour."[11]

Estimates of the prevalence of PEH, in both the general population and athletes, vary widely. There have been no large studies in Australia, however, a study of 1838 parishioners in a Norwegian commune revealed a prevalence of 12%, while a Danish population study showed only a 1% lifetime prevalence.[12,13] Meanwhile, a study of 4000 participants in a Dutch cycling event demonstrated a 26% prevalence.[14] Primary exercise-induced headaches tend to affect younger people and last from 1-24 hours. Only 8% of people reporting PEH in the Dutch study reported headaches lasting more than one day.[14]

Pathophysiology

Most theories of the pathophysiology of PEH include intracranial venous congestion or traction on meningeal structures, secondary to increases in intra-abdominal/intrathoracic pressure induced by exercise.[15,16] This theory is partly supported by Doepp et al (2007), who observed retrograde venous flow across the internal jugular vein valve during Valsalva-like manoeuvres in 70% of patients with PEH, compared with only 20% of control patients.[17] The authors stated that this itself was not enough to fully explain the pathophysiology of PEH, particularly as this explanation would not be sufficient to explain patients who get headaches after prolonged aerobic exercise (see figure 3), rather than Valsalva-like manoeuvres such as gym-based strength training.[17,18]

An alternative theory that would more adequately explain PEH associated with aerobic exercise has been suggested in case reports by Heckman et al. They suggest that impaired autoregulation of cerebrovascular smooth muscle may impair the ability of resistance vessels to adequately respond to increased blood pressure during exercise.[19] This may result in abnormal vasodilation, vessel wall oedema or increased cephalic blood volume.[19]

Defining the pathophysiology is also complicated by a lack of clarification of the term 'exertion', and thus having a benchmark against which to study.[18] This is entrenched in the studies referenced in this How to Treat, as they all rely on patient reported 'exertion'. That is, the degree of aerobic

activity/'exertion' associated with PEH has not been quantified in the literature.

The survey conducted in Dutch cyclists asked participants to identify risk factors they had recognised for their headaches. They identified significant risk factors of extreme exertion (50% of participants), low fluid intake (39%) and warm weather (39%).[14] Dehydration and/or heat stress can induce headaches in themselves, and this needs to be considered in the diagnosis.[20] Other identified risk factors include hypoglycaemia, caffeine use and past history of tension-vascular headaches.[21]

Assessment

The International Headache Society's guide for primary exertional headache lists the following criteria required for diagnosis: [2]

- A: pulsating headache fulfilling criteria B and C
- B: lasting from five minutes to 48 hours
- C: brought on by and occurring only during or after physical exertion
- D: not attributed to another disorder

The most common associated symptoms include photophobia (47%), neck muscle soreness (40%), phonophobia (35%), throbbing character (23%), unilateral headaches (23%), nausea (15%), and vomiting (3%).[14]

Fully assess patients presenting for the first time with headaches to exclude more common headaches syndromes (see table 1), before making a diagnosis of PEH. The rates of coexistent migraines could be as high as 42%, therefore consider this diagnosis.[22] It could be argued that some susceptible athletes initially suffer a PEH that may transform into an exercise-induced migraine variant headache (see figure 1).[14]

It is important to make the distinction between a headache provoked by exercise as a symptom of an underlying pathology, and that of a primary headache disorder.[23] This is particularly pertinent as the proportion of PEH being diagnosed is decreasing relative to 'symptomatic headaches' (for example, AVM, sentinel bleed, other causes listed in table 1) thanks to improvements in neuroimaging techniques.[23]

Head and neck conditions that may manifest with exercise include AVM , arterial dissection, intracranial hypertension, type 1 Chiari malformation, spontaneous intracranial hypotension, cervical disk disease, cerebral venous thrombosis, cardiac cephalalgia, and phaeochromocytoma.[22] When a head and neck condition is suspected, perform a brain MRI/MRA (magnetic resonance angiography) to exclude vascular abnormalities and other structural causes, as well as a cervical spine X-ray/MRI to exclude cervical disc or cervicogenic headache.

Figure 3. Prolonged aerobic exercise.

FULLY ASSESS PATIENTS PRESENTING FOR THE FIRST TIME WITH HEADACHES TO EXCLUDE MORE COMMON HEADACHE SYNDROMES.

Fully assess and urgently manage significant red flag, neurological symptoms and signs suggestive of a more sinister diagnosis (see box 1 and table 1) with referral for neuroimaging and appropriate urgent medical care.

Investigations

As PEH is a diagnosis of exclusion, investigation should aim to exclude other causes of headache. Take particular care to assess the cervical spine. Investigation should also evaluate the patient's history of migraines, medications and sinusitis. Recent medication changes, or rebound headaches from overuse of analgesics may be implicated, with the patient incorrectly assigning blame to exercise. Investigating a family history of headaches may also provide an indication of aetiology.

Blood tests may be appropriate if the patient exhibits symptoms suggestive of some of the uncommon causes of headache listed in table 1. Haemoglobin and iron studies, thyroid function, and HbA1c and BSL may be indicated.

Management

As with many conditions, the simplest form of treatment is to avoid triggers, however, recommendation to avoid exercise is to be discouraged.[24] This is not only because athletes dearly love their sport, and may rely on it for income, but because exercise is increasingly recognised for the positive effects it has on general health and wellbeing. Triggers that can be managed include reducing the degree of heat stress, optimising hydration and wearing appropriate clothing with a high wicking factor.

When non-pharmaceutical measures fail, medication is indicated to treat PEH. Indomethacin is the most commonly prescribed medication, but it should be noted there is a paucity of evidence to support this, and it is anecdotal at best.[24,25] The doses used can vary from 25-250mg per day, with the medication given 30-60 minutes before activity.[23] If PEH is happening regularly, indomethacin may be used daily, but this has to be weighed up against the risk of side effects, in particular, gastrointestinal upset. It has been suggested that indomethacin's action is via its effect on cerebrospinal fluid pressure.[24]

Other medications reported in small case series include ergotamine (dose unspecified) and propranolol (1-2mg/kg as preventive treatment).[7,26]

Other exercise-related headaches

Other types of exercise-related headaches have been described, yet they are less common. As described by Fricker and Fields, these headaches include: [21]

- Acute effort migraine: precipitated by short bursts of high-intensity activity, such as sprinting. It will present like a migraine, with nausea, vomiting and neck stiffness, and may require hours of rest or sleep to relieve. These are often responsive to ergotamine preparations.
- Weightlifter's headache: caused by referred pain from the neck, and responds well to analgesics, massage and physiotherapy.
- Altitude headache: a component of acute motion sickness, it is associated with altitudes higher than 2500m.
- Diver's headache: can result from multiple factors, including goggle compression on the scalp and excessive gripping of the mouthpiece in scuba divers.
- Intrathoracic/intracranial pressure headache: initially severe and rapid onset, then a dull headache lasting up to 24 hours, immediately following a Valsalva-like manoeuvre.[21]

Migraine

DESPITE fewer than 10-25% of individuals who have migraines reporting exercise as a trigger, migraine (with a prevalence of 15-29% in the general population) is an important differential in the assessment of headache in athletes.[27,28,29]

A literature review on migraine epidemiological studies revealed that only approximately 50% of those with frequent and/or severe migraine seek professional help.[30] This appears to be closely related to self-diagnosis and whether a migraineur can cope without prescription painkillers.[31,32]

Migraine is a complex neurological disorder that comprises both structural and functional abnormalities within the brain, resulting in extreme neuronal sensitivity to changes in homeostasis.[31] There are many theories to explain how this induces migraine headaches, including activation of the trigeminovascular pathway and serotonin dysregulation.[33,34] Research has also identified hyperexcitability of a migraineur brain between attacks. Suggestions to explain this include mitochondrial dysfunction and low levels of intracerebral magnesium.[35,36] Additionally, while migraineurs show hypersensitivity to light, touch and other sensations during an attack, this sensitivity can decrease and lead to a higher tolerance to any painful stimulus during the time between migraine attacks.[37]

Common triggers for migraine include: stress; fatigue; dehydration; alcohol (especially red wine);

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monosodium glutamate (MSG); aspartame; chocolate; aged cheese; pickled foods; processed meats; cultured dairy products; certain odours; allergies; oversleeping; and missed meals.[38] As mentioned, 10-25% of migraineurs report exercise as a trigger.

The clinical distinction between exercise-induced migraine and PEH can be difficult because of the interrelationship of triggers, treatments, and syndromes broadly, as shown in figure 1.

Exercise: trigger or treatment for the migraineur?

Part of the International Classification of Headache Disorders definition of 'migraine without aura' includes the headache being aggravated by or causing avoidance of routine physical activity.[2] The definition does not include exercise as a trigger, yet some patients report exercise as a trigger for their migraines. A systematic review of 25 publications assessing frequency of migraine triggers found that 25% of migraineurs report physical activity/exertion as a trigger for their migraines.[29] Interestingly, there have been few reports of exercise-induced migraine in prospective studies using aerobic exercise as a treatment for migraine. Varkey and colleagues reported, in 2009, a 0.1% incidence of migraine in proximity to exercise in one trial, and later in a similar trial, no adverse headache events.[36,39] The patients in these studies were required to exercise up to 16 out of 20 on the rate of perceived exertion scale, correlating with a description of 'very hard'.[40]

A 2017 study by Varkey used a test-retest method with patients who reported exercise as a potential trigger for their migraines.[41] Patients completed a VO2 peak assessment (exercising to maximal capacity) and kept a headache diary. Of the 33 VO2 peak tests, a migraine attack occurred within 24 hours 14 times (42% of cases). Of the 14 test-retested patients, three (21% of patients) reported migraine following both tests, five (36%) reported migraine after one of the two tests, and six (43%) did not report migraine after either of the tests. This study did not describe how they diagnosed migraine after the aerobic exercise nor did they specify if migraineurs were episodic or chronic. Thus, exercise caution in considering these headaches as migraines, as they may have been PEHs.

Similarly, the study makes no mention of whether participants were allowed to 'abort' potential migraines through medication or otherwise, adding to the difficulty in distinguishing between PEHs, common headaches and migraine. However, it does appear to demonstrate that some migraines can be induced by 'very hard' exercise.

The apparently conflicting results between patient reported triggers of migraines and results produced in prospective studies, demonstrates the inter-relationship between different headache syndromes (see figure 1).

A systematic review of headache interventions incorporating aerobic exercise reveals at least modestly beneficial outcomes for migraines.[26] The review noted that despite reported improvements in some secondary outcomes (health-related quality of life, disability and depression), drawing conclusions on exercise specifically was difficult, as it was only one part of a multicomponent intervention.

Although the evidence for exercise as a trigger or treatment for migraines remains inconclusive, it seems to suggest both are possible. Regular moderate exercise is beneficial as part of a multicomponent intervention in the management of migraines, while very high intensity exercise can induce migraines. It is important to convey this to patients to ensure they do not avoid exercise entirely to prevent migraines, instead exercising within their capacity.

NON-PHARMACOLOGICAL TREATMENTS ARE IMPORTANT IN MIGRAINE MANAGEMENT AND ACUTE TREATMENT.

Management

Non-pharmacological treatments are important in migraine management and acute treatment. These can include cold packs over the forehead, hot packs on the neck and shoulders, neck stretches and self-mobilisation, and rest in a quiet dark room.

Australian Therapeutic Guidelines recommend non-opioid analgesics as first-line pharmacological management of acute migraines.[42] Aspirin and any NSAID are useful. Naproxen has a longer duration of action, which is helpful in limiting rebound headaches, however, it may take longer for an effect. The use of triptans (for example sumatriptan, naratriptan) in unresponsive migraines is recommended. Response to individual triptans is variable, thus it is recommended the patient try a different triptan if they are unresponsive to the first.

Other treatments that may be useful include ergotamines, antiemetics, 100% oxygen via non-rebreather, or lidocaine 4% nasal drops.[37] A recent meta-analysis of randomised controlled studies demonstrated that IV magnesium can reduce acute migraine attacks within 15-45 minutes.[43]

Consider migraine prophylaxis when a patient requires treatment for migraine on more than two days a month.[42] Choice of prophylactic drug can be based on patient preference as there have been no studies directly comparing prophylactic drugs, nor can a response always be guaranteed. The range of medications listed by the Australian Therapeutic Guidelines for prophylactic treatment emphasise the lack of understanding, and multifactorial nature, of migraine pathophysiology. Of the eight drugs listed, only three are currently approved by the TGA for migraine prophylaxis: pizotifen, propranolol and topiramate. Exercise caution when using propranolol and pizotifen in athletes as they can increase the risk of heat illness.[44] For this reason, topiramate is recommended as first-line therapy. Given the complexity of pharmacological treatment options, specialist referral may be required.

Supplements that may be of benefit to migraineurs include oral magnesium and riboflavin. Both have been shown to reduce the prevalence of migraines, and magnesium may also reduce the intensity of migraines.[33,43]

Heat illness

EXERTIONAL heat illness is an important differential in the diagnosis of headache in athletes. This condition is among the leading causes of death in young athletes, and the incidence in community fun runs is increasing.[46,47] It is also more likely in Australia, because of the high temperatures and humidity we experience during summer (see table 2 and figure 4).

Sports Medicine Australia estimates risk for exercising in hot weather using ambient temperature and humidity, creating guidelines for activity management to minimise heat stress.[20] Heat stress in direct sunlight is measured using the 'wet bulb globe temperature' (WBGT), which incorporates humidity, wind speed, sun angle and degree of cloud cover. When determining risk of heat illness for athletes, Sports Medicine Australia recommends the use of both ambient temperature and WBGT. Because of ease of use, ambient temperature is suitable for hot dry days, however, WBGT is useful when humidity is high.[20]

As a result of restrictions in available weather data, the following information is based on ambient temperature. The average weather in January, February and March in Sydney places it in the low-moderate risk category for the whole three months. January has an average of 10 days above 30°C, which when combined with humidity data, places it in the high- to very-high-risk category. Brisbane's average weather data places it in the moderate-risk category for December through to March, and Darwin is in the high- to very-high-risk category all year.[47,48] Perth, Hobart and Adelaide climate averages do not meet at-risk categories, how-

PHOTO: Andy Brownbill/AAP Image

Figure 4. Alize Cornet feeling the heat during the Australian Open tennis championships in Melbourne, 2018.

ever, people should still be aware of the risks, and take care on hot and humid days.

With winter sports such as football in pre-season training, and summer sports such as cricket in competition, it is important to recognise that these conditions increase the athlete's risk of developing heat-related illnesses, and training/competition should be adjusted accordingly.

Exertional heat illness exists as a spectrum of pathology, with heat exhaustion at one end, and exertional heat stroke at the other. In the early stages of exertional heat illness, it may be difficult to predict the progression of the illness to the severe form of heat stroke, thus it is important to treat the condition vigorously and early.[44]

IT IS IMPORTANT TO TREAT EXERTIONAL HEAT ILLNESS VIGOROUSLY AND EARLY.

Patients with heat exhaustion present with fatigue, dizziness, headache, nausea, vomiting, malaise, hypotension, pallor and confusion. As the severity of the heat illness progresses, they will begin to have end-organ damage because of raised body temperature, with restlessness, profound confusion, and eventual syncope and unconsciousness. Exertional heat stroke usually has a sudden onset, does not have a prodromal period and has non-specific symptoms.[49] The progression to exertional heat stroke is defined by the presence of neurological symptoms, including delirium, deep coma and seizures.[50]

Exertional heat stroke has been separated from classic heat stroke, as exertional heat stroke patients are often still sweating, have a severe metabolic acidosis (as opposed to mixed in classic heat stroke) and hypoglycaemia.[44] Exertional heat stroke has behavioural influences in its aetiology, as the risk of developing it is higher in patients who are motivated to exercise in hot conditions, including athletes and military personnel.[51]

There are many acquired and functional factors that can predispose active adults to heat intolerance, including reduced skin area-to-mass ratio, dehydration, use of alcohol prior to activity, viral/bacterial infection, jetlag and previous history of heat illness.[52] Studies in the US military have also shown that risk of exertional heat stroke is increased by consecutive days in the heat.[52]

Treatment of exertional heat illness is focused on reducing the patient's core body temperature, while supporting their airway, breathing and circulation. Reducing the patient's body temperature should be done in whatever way possible. Removing the patient from any source of heat stress (for example, radiant heat) is paramount. Techniques may include external cooling with ice packs to large superficial blood vessels, and to the head/neck/groin (see figures 5 and 6), immersion in cold water (see figure 7) and fanning the patient (see figure 8).[44] Internal cooling may be achieved with cool intravenous fluids, and when the patient is sufficiently conscious, cold oral fluids. There is no evidence that pharmacological treatment is of benefit, particularly antipyretics, which may be hepatotoxic in this setting.[44]

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Figure 5. Cool towel.

Figure 6. Ice cooling headgear.

Figure 7. Cold water immersion.

Table 2. Risk of heat illness relative to temperature and humidity

Ambient temperature	Relative humidity	Risk of heat illness
15-20°C		Low
21-25°C	Exceeds 70%	Low to moderate
26-30°C	Exceeds 60%	Moderate
31-35°C	Exceeds 50%	High to very high
36°C and above	Exceeds 30%	Extreme

Adapted from Sports Medicine Australia's Hot Weather Guidelines[47]

Table 3. Comparison of PEH, migraine and heat illness

	Primary exertional headache	Migraine	Heat illness
Features	Pulsating headache Lasts five minutes to 48 hours Brought on by exertion	Headache ± aura Photophobia Nausea/vomiting	Fatigue Dizziness Headache
Key risk factors	Extreme exertion Dehydration Warm weather	Fatigue Stress Alcohol	Hot and humid weather Dehydration Exertion
Common treatment	Ergotamine Indomethacin Propranolol	Aspirin Naproxen Pizotifen	Remove source of heat stress Immersion in cold water IV/oral cold fluids

Figure 8. Fanning.

Online resources

Sports Medicine Australia
Hot Weather Guidelines and Beat the Heat Fact Sheet
https://bit.ly/2q539BP

UpToDate
Primary exertional headache (requires subscription and logon)
bit.ly/2t4uqcf

NPS Medicinewise
Migraine patient resource
bit.ly/2FdvjUQ

References

Available on request from howtotreat@adg.com.au

Prognosis

WITH detailed history-taking and examination, it is possible to identify specific risk factors and triggers for an athlete's headache, and therefore target treatment appropriately. In this process, it is important to recognise the coexistence of headache syndromes, and the need for multimodal treatment approaches, as described above. The best outcome, returning to sport, is achievable by minimising risk and maximising treatment. This includes recognition and management of associated risk factors for headaches in sport (including hydration), adequate management of migraine disorders, and awareness and implementation of strategies to reduce heat illness.

The future

THE list of differential diagnoses for headache in athletes is extensive and needs further investigation to define the epidemiology. Despite the worldwide prevalence of headache being high, there is no prevalence data in Australian athletes, making understanding the impact of exercise-induced headaches in Australia difficult. Further research could focus on determining Australian aetiologies and defining the degree of exertion that induces headaches. Research is also required to develop treatment to abort and prevent primary exercise-induced headaches.

Case study

ANDREW, 28, an elite footballer and known migraineur, presents to his GP in January with a four-week history of increasing intensity, frequency, and severity of right occipital to supraorbital sharp headaches. The headaches usually occur during training or after heavy exertion (but not always), and he is forced to stop what he is doing. There is associated nausea, mild dizziness and poor concentration.

In the past 10 days, he has also had vomiting associated with these headaches. In the past four weeks, at best he has gone three days without these headaches, which last anywhere from 30 minutes to three hours. At worst he has had runs of two headaches a day for a few days. He also describes a more frequent, dull, bilateral occipital headache. Andrew has tried physiotherapy and pizotifen nocte, which has only been partially helpful.

He has a history of migraines since age 14. He is troubled by these periodically, but there can be years between clusters of migraines. The most recent cluster was six months earlier, when the GP treated him with pizotifen and sumatriptan. He was not particularly compliant with the medication, and is concerned about side effects of increased appetite and weight gain.

Andrew had one concussion during a football match. He played the next week.

Andrew volunteers that his migraine triggers as stress/anxiety-related, and after long runs. The episodes are most common during

preseason training, where training is both intense and in warm/humid conditions. Andrew is currently in the middle of preseason training and his wife had their first child eight months ago.

Andrew's examination is normal, and his headache intensity is 5-9/10 on the Visual Analogue Pain Scale.

The GP is concerned about the change in the pattern of headaches and refers Andrew to a neurologist. Investigations include X-ray of his cervical spine, MRI cervical spine and MRI/MRA brain. X-ray/MRI spine show minimal bulging of C3/4 and C4/5 discs, with no nerve compressions. MRI/MRA brain scans are normal.

A diagnosis of migraine, cervical headache and primary exertional headache is made.

In consultation with his sports and exercise physician and his neurologist, Andrew starts regular topiramate 25mg nocte, increasing to 25mg bd after one week. He is advised that despite his desire for a quick fix, a good response may take a few weeks.

Andrew returns to the physiotherapist for treatment of the cervicogenic component of the headache and postural retraining. He is also encouraged to employ other preventive strategies for headache management, including: hydration; using cooling techniques such as ice vests and wearing clothes with a high wicking factor when exercising; exercising earlier in the morning when the temperature is cooler; and avoiding alcohol.

Andrew, his sports and exercise physician, and his football club work together to rearrange Andrew's training schedule to ensure his high-intensity training outdoors occurs in the morning and he is under the air conditioners in the gym in the afternoon.

After one month of treatment, there is a good response and topiramate is discontinued. Andrew has returned to full training and is managing well. On review a month later, Andrew has not had a recurrence of migrainous headaches, but is experiencing dull headaches on a fortnightly basis. These respond well to naproxen.

The recognition that Andrew has a combination of all three headache syndromes is vital in ensuring the correct combination of management strategies is employed for the best possible outcome.

Key points

- Headache syndromes in athletes often overlap and it is important to recognise this.
- Recognising and effectively treating exercise-related headaches is vital to reducing restrictions to exercise.
- Encourage patients to seek medical advice about their headaches, thus reducing the stigma associated with headaches, and ensuring they are not inhibited by an often-treatable condition.
- Further research is required on defining the relationship and impact of exercise, heat and headaches on athletes and the general population, thus enabling more targeted therapy.

How to Treat Quiz

Headaches in athletes

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1. Which TWO statements regarding headache are correct?
a) Tension-type headaches are the most common type of primary headache.
b) Headaches can be classified as primary, secondary, vascular, or neuropathies and facial pains.
c) Classifications are a useful diagnostic tool to rule out secondary headache before diagnosing a primary headache disorder.
d) Electrographic studies have revealed a direct correlation between headache severity and muscle tension, confirming the latter as the cause.

2. Which THREE are red flags when assessing a patient with headache?
a) New or unaccustomed headache.
b) Systemic symptoms.
c) Family history of headache.
d) Stiff neck or meningeal signs.

3. Which TWO statements regarding exercise are correct?
a) Almost one-third of Australian adults are overweight or obese.
b) Almost one-third of Australian children (aged 2-17) are overweight or obese.
c) Exercise has significant health benefits and can be used as a 'medication' to treat an extensive range of medical conditions.
d) RACGP guidelines recommend that adults undertake 2.5-5 hours of moderate intensity physical activity, or 1.25-2.5 hours of vigorous intensity physical activity, or a combination of these, per week.

4. Which THREE factors have been described as precipitants in primary exercise-induced headaches (PEHs)?
a) History of hypertension.
b) Low fluid intake.
c) Warm weather.
d) Hypoglycaemia.

5. Which TWO statements regarding PEHs are correct?
a) PEH is a diagnosis of exclusion.
b) Exercise should be ceased, or at least discouraged, when managing PEHs.
c) NSAIDs are the mainstay of management of PEHs.
d) Common symptoms include photophobia, neck muscle soreness and phonophobia.

6. Which THREE have been reported as common triggers for migraine?
a) Aged cheese.
b) Alcohol.
c) Monosodium glutamate.
d) Second-hand cigarette smoke.

7. Which TWO drugs are recommended for the prophylaxis of migraine?
a) Non-opioid analgesics, for example, NSAIDs.
b) Lidocaine 4% nasal drops.
c) Beta blockers, for example, propranolol.
d) Anticonvulsants, for example, topiramate.

8. Which THREE statements regarding heat illness are correct?
a) Exertional heat illness is more likely in Australia because of the high temperatures and low humidity we experience during summer.
b) Exertional heat illness is among the leading causes of death in young athletes.
c) The risk of heat illness in Sydney in January is in the high- to very-high-risk category.
d) It is important to treat exertional heat illness vigorously as it is difficult to predict the progression of the illness to the severe form of heat stroke.

9. Which THREE modalities may be used to cool patients with exertional heat illness?
a) External cooling with ice packs.
b) Immersion in cold water.
c) Antipyretics.
d) Cool IV fluids.

10. Which ONE feature is common to both primary exertional headache and heat illness
a) Fatigue.
b) Dehydration.
c) Use of alcohol.
d) Headache with or without aura.

CPD POINTS

- We have a new How to Treat website (www.howtotreat.com.au) where you can read this article and take the quiz to earn CPD points.
- Each article has been allocated 2 RACGP QI&CPD points and 1 ACCRM point.
- RACGP points are uploaded every six weeks and ACCRM points quarterly.