Paediatric Special

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Welcome to the eighth issue of MEDiscene, a paediatric special with a broad range of articles from some of our exceptional consultants.

We investigate some of the common paediatric issues faced by GPs, including eczema, burns, foot and ankle issues and facial pain. I very much hope that you find these informative and, as ever, welcome your feedback on any topics that you’d like to see in future issues (email: gpliaison@cromwellhospital.com).

This is the first issue since my appointment as General Manager at the Cromwell. I am thrilled to be taking on this challenging role and leading the hospital to even greater success in 2014 and beyond. I am also pleased to announce that Philip Luce has been appointed to the role of Operations Director. Philip previously led our heart and lung centres, and has been instrumental in developing these into world class facilities.

We look forward to seeing you at one of our symposium events this year, which take place at our new venue, Kensington Town Hall. We have extended the programme from four to six events through 2014, and a full breakdown of topics and dates can be found on page 18.

With warm regards,

Philippa Fieldhouse
General Manager
Bupa Cromwell Hospital

The opinions expressed in this magazine are the personal views of the authors and do not necessarily reflect those of Bupa Cromwell Hospital.

The GP Liaison team provides a bespoke service for GPs. We can assist you with any enquiry and help to facilitate patient referrals via our dedicated referral line - Cromwell Direct - 0800 783 9229.

We understand that our GP colleagues want to keep up-to-date on new treatments, diagnostics and services. Therefore, we work closely with the hospital consultants to coordinate our educational programme, which can be found in the health professionals area of our website. If you are unable to attend, we can arrange a practice visit at a convenient time for you in order to:

- discuss the latest developments at the hospital
- explore how we can work together more effectively
- introduce new consultants

If you have any questions or would like more information about Bupa Cromwell Hospital, please contact us:

Richard Longes
020 7460 5909
07714 386 680
richard.longes@cromwellhospital.com

Laxmi Sonara
020 7460 5842
07743 884 513
laxmi.sonara@cromwellhospital.com

Our revamped website - bupacromwellhospital.com - has just gone live. It features a brand new homepage, new videos of our key clinical areas, and is fully responsive to mobile devices such as tablets and smartphones. The improvements will greatly enhance the user experience, particularly for patients and healthcare professionals accessing the site on the move.

In addition, GPs will soon be able to register for educational events directly through a new events management system which will confirm your place at the event (if space is available) as soon as you apply. This should be completed by March.

Take a look – we’d love to hear your feedback!

CQC finds Cromwell fully compliant

Bupa Cromwell Hospital had an unannounced Care Quality Commission (CQC) inspection back in October and we are pleased to say that they found us to be fully compliant, with no specific recommendations required.

Staff across the hospital have worked hard to ensure that we offer the highest possible standards of care, and it is very reassuring when this is recognised, both by patients and by the CQC.

The full inspection report, published on 21 November 2013, can be downloaded from cqc.org.uk.
Investigations

- Investigations are rarely required to establish the diagnosis.
- Most children with mild atopic eczema do not need clinical testing for allergies. Estimation of immunoglobulin E (IgE) and specific radioallergosorbent tests (RASTs) only confirm the atopic nature of the individual.
- Swabs for bacteriology are useful if patients do not respond to treatment, in order to identify antibiotic-resistant strains of Staphylococcus aureus or to detect additional streptococcal infection.

Management

NICE clinical guidance on atopic eczema in children recommends a stepped approach to management, which means tailoring the treatment step to the severity of the atopic eczema. Emollients should form the basis of management and should always be used, even when the atopic eczema is clear. Management can then be stepped up or down according to the severity of symptoms.

- Provide information about the condition, the factors that may provoke it, the role of different treatments and their effective, safe use. It is important to emphasise the correct quantities of topical treatments to use. Provide written information to reinforce discussion.
- Include information on how to recognise flares of atopic eczema (increased dryness, itching, redness, swelling and general irritability).
- Provide information on recognising the symptoms and signs of bacterial infection (weeping, crusting or pustules, rapidly worsening atopic eczema, failing to respond to therapy, fever and malaise).
- Provoking factors should be identified and avoided when practical.
- Keep the skin hydrated.

Emollients

Emollients are the mainstay of therapy and essential to manage eczema effectively. They should be applied as liberally and frequently as possible and continual treatment with complete emollient therapy (combinations of cream, ointment, bath oil and emollient soap substitute) will help to provide maximal effect.

Leave-on emollients should be prescribed in large quantities (250-500g weekly) and made easily available to use at nursery, pre-school or school. Ointments (such as Eumovate®) are preferable for dry skin or at night, whilst creams (such as Diprobase) are preferable for inflamed areas for use during the day.

Patients getting frequent flares may benefit from emollients with an antiseptic property (e.g. Dermol® 600 Bath Emollient or Dermol 200® Shower Emollient), whilst those with very itchy skin may benefit from an emollient with an antipruritic property (such as Balneum-plus® Bath Oil).

Topical steroids

The intensive use of emollients will reduce the need for topical steroids, but when these are required they should be used at the lowest appropriate potency and only applied thinly to inflamed skin. The strength of steroid is determined by the age of the patient and the site and severity of eczema; for example mild potency if on a child’s face (e.g. 1% hydrocortisone), and moderate potency for a child’s trunk or limbs (e.g. Eumovate® - clobetasone butyrate 0.05%). Moisturisers should be given twenty minutes to dry into skin before the steroid is applied.

Bacterial infection

The use of topical antibiotics, including those combined with topical corticosteroids, should be reserved for cases of clinical infection in localised areas and used for no longer than two weeks.

Diagnostic criteria

An itchy skin condition (or report of scratching or rubbing in a child) plus three or more of the following:

- History of itchiness of flexor surfaces or around the neck (or itchiness of the cheeks in children <4 years).
- History of asthma or hay fever (or history of atopic disease in a first-degree relative in children <4 years).
- General dry skin in the past year.
- Visible flexural eczema (or eczema affecting the cheeks or forehead and outer limbs in children <4 years).
- Onset in the first two years of life (not always diagnostic in children aged under 4 years).

Trigger factors

- Irritants - soaps and detergents (including shampoos, bubble baths and shower gels).
- Skin infections.
- Contact allergens.
- Dietary factors.
- Inhaled allergens, e.g. house dust mites, pollens, pet dander and moulds.

A topic eczema (atopic dermatitis) is a chronic, relapsing, inflammatory skin condition characterised by an itchy red rash that favours skin creases such as the folds of the elbows or behind the knees. Atopic eczema often has a genetic component that leads to the breakdown of the skin barrier. This makes the skin susceptible to trigger factors, including irritants and allergens, which can make the eczema worse.

It is a common condition and the prevalence is increasing. Eczema affects 15-20% of school aged children, and the majority (about 80%) of cases present before the age of five years.

Many cases of atopic eczema clear up or improve during childhood, but others persist into adulthood. Some children with atopic eczema will go on to develop asthma and/or allergic rhinitis; a sequence of events that is sometimes referred to as the ‘atopic march’.

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Dr Jamal Karwan MB ChB PLAB
DipAD MRCGP (Lon) MRCP (UK)
IS a General Practitioner at Bupa Cromwell Hospital

CROMWELL DIRECT 0800 783 9229

Background photo - Science Photo Library
Systemic antibiotics that are active against Staphylococcus aureus and streptococcus should be used to treat widespread bacterial infections of atopic eczema in children for 1-2 weeks according to clinical response. Using combined steroid / antibiotic preparations (e.g. Fucibet and Fucidin-H cream) on a regular basis should be avoided as this will increase the risk of antibiotic resistance.

Treatment with immunomodulators
Topical pimecrolimus and tacrolimus are options for atopic eczema not controlled by maximal topical corticosteroid treatment, or if there is a risk of important corticosteroid side-effects (particularly skin atrophy).

NICE has recommended that treatment with tacrolimus or pimecrolimus be initiated only by physicians with a special interest and experience in dermatology, and only after careful discussion with the patient about the potential risks and benefits of all appropriate second-line treatment options.

When to refer to a specialist

**Immediate** (same day) referral for specialist dermatological advice if eczema herpeticum is suspected. This would be suggested by the appearance of clusters of vesicles in an area of rapidly worsening, painful eczema.

**Urgent** (within two weeks) referral if the atopic eczema is severe and has not responded to optimum topical therapy after one week, or treatment of bacterially infected atopic eczema has failed.

**Routine** referral if:
- The diagnosis is uncertain.
- Management has not controlled the atopic eczema satisfactorily.
- The child or parent / carer may benefit from specialist advice on treatment application such as bandaging techniques.
- Atopic eczema on the face has not responded to appropriate treatment.
- Contact allergic dermatitis is suspected (e.g. persistent atopic eczema or facial, eyelid or hand atopic eczema).
- The atopic eczema is giving rise to significant social or psychological problems for the child or parent / carer (sleep disturbance, poor school attendance).
- Atopic eczema is associated with severe and recurring infections, especially deep abscess or pneumonia.

Eczema and allergy
Food allergy has a role in 7% of atopic eczema cases. It predominantly affects children under the age of three, and should be considered in this age group if associated with a perioral flare when eating. Also if moderate to severe eczema is responding poorly to appropriate treatment, or when there are co-existing GI symptoms. Reflux, vomiting, colic, diarrhoea and food refusal can all be associated with cow’s milk protein allergy (CMPA), as can wheezing and failure to thrive. For bottle fed infants aged under six months with moderate or severe atopic eczema that has not been controlled with emollients and mild topical corticosteroids, NICE recommends an alternative to cow’s milk formula. The recommendation is for a 6-8 week trial of an extensively hydrolysed protein formula (e.g. Nutramigen or Cow & Gate Pepti) or amino acid formula (such as Neocate).

GP’s should consider a diagnosis of inhalant allergy in children with seasonal flares of atopic eczema, children with atopic eczema associated with asthma or allergic rhinitis, and children aged three years or over with atopic eczema on the face, particularly around the eyes.

**Stepped approach to management**

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Facial pain in children has many possible causes, but a good history and examination will undoubtedly provide the most diagnostic information. Whilst an accurate pain history can be difficult to obtain in younger children, questions about speed of onset, location and periodicity are particularly important. Any associated factors such as trauma, rash, lacrimation and fever should also be documented.

**Examination**
Visible facial swelling in children is most often due to allergy, infection or trauma. In an acutely unwell child, assessment of airway, breathing and circulation (ABC) is paramount. Rapidly evolving external facial swelling (for example due to a hypersensitivity reaction or dental sepsis) is very painful and may mirror potentially life-threatening internal upper airway swelling (represented by inspiratory noise, dysphagia, odynophagia and dysphonia). Children with these features should go by ambulance to a paediatric emergency department. Painful facial swelling that evolves less rapidly is also often infective, and careful inspection of the eyes, nose, mouth and eardrums should be performed. Assessment of the skin and oral mucosa, palpation of the cervical lymph node basins and cranial nerve examination should also be carried out. During the history and examination process the following causes should be considered:-

**Ear**
Inflammation of the middle ear is common in childhood and this typically leads to localised stinging pain with pulse-synchronous ear ‘palpitations’.

Associated features include conductive hearing loss, fever, fatigue and malaise. While usually viral, antibiotics are often prescribed in lieu of a “watch-and-wait” policy. This has reduced acute bacterial complications such as mastoiditis, labyrinthitis, meningitis, abscess and sinus thrombosis.

**Teeth**
Toothache is usually brought on by drinking sweet, hot or cold liquids. Tooth surface loss can be due to dental decay (high sugar intake) or demineralisation (usually from drinking sugary or acidic drinks such as...
Dentofacial trauma is common in children and conditions such as Crohn’s disease. Ulcers, or in rare cases systemic mucocutaneous primary infection, idiopathic (e.g. recurrent oropharyngeal mucositis due to autoantibodies), can cause axial compression of the condylar growth centre, resulting in pain in the temporomandibular joint (TMJ), dysfunction and asymmetrical mandibular growth.

**Nose**

Sinusitis is considered acute if symptoms last for less than four weeks, subacute if lasting from 4-12 weeks, or chronic if lasting for more than 12 weeks. The presenting features of acute sinusitis depend on the sinuses involved, which in turn depends on the age of the child. The maxillary and ethmoid sinuses are susceptible from infancy, while frontal and sphenoid sinusitis is rare before school age. A diagnosis can be made if there is acute pain which is worsened when sitting or standing, and associated with signs of inflammation and pus at the site of nasal drainage.

**Throat**

Acute tonsillitis usually occurs in children and young adults. This is most commonly caused by viral or bacterial infection, (usually Group A Strept) and symptoms may include a sore throat and fever. Peritonsillar abscess (quinsy) is most common in older children. Chronic tonsillitis and hypertrophy is usually painless but may contribute to obstructive sleep apnoea.

Patients presenting with orofacial pain must have a careful examination of the oral mucosa for abnormalities such as skin peeling or ulceration. These can be due to primary infection, idiopathic (e.g. recurrent ulcers), or in rare cases systemic mucocutaneous conditions such as Crohn’s disease.

**Skeletal**

Dentofacial trauma is common in children and should be considered when there is pain in the facial skeleton and overlying soft tissues. Careful examination and documentation is important, especially if inconsistencies in the presentation raise a concern of non-accidental injury (NAI). Conditions resulting from traumatic injury are not always immediately apparent. Teeth can become non-vital, painful, grey-coloured and predisposed to infection at gum level. Falls to the chin can cause axial compression of the condylar growth centre, resulting in pain in the temporomandibular joint (TMJ), dysfunction and asymmetrical mandibular growth.

Pain around the TMJ in the absence of trauma may still be musculoskeletal in origin, but may be referred pain from other pathologies of the ears or oropharynx.

Musculoskeletal conditions affecting the TMJ regions in children can be divided into two broad categories: joint abnormalities (internal derangement) or problems with the associated soft tissues (myofascial). The most common form of internal derangement in older children is displacement of the intra-articular disc. When opening the mouth the disc may flick backwards to take up a more normal position which may be associated with pain, palpable or audible clicking and occasional locking. In younger children disc problems are less common and pathologies of the joint or joint surfaces should be considered.

Pain in the soft tissues of the cheeks (particularly on both sides) is not uncommon and is often precipitated by a tooth grinding habit (bruxism). This is typified by hypertrophy of the masseter muscles that may be tender to palpation. As mentioned earlier, careful examination of the adjacent major salivary glands and oropharyngeal mucosa should be performed in patients presenting this way.

In all cases, a careful history and examination will identify the cause in the majority of cases, otherwise referral to a specialist is recommended.

**Summary**

Children presenting with facial pain require careful assessment, and the diagnosis depends heavily on associated features of fever or systemic upset. A detailed history and thorough examination will identify the cause in the majority of cases, otherwise referral to a specialist is recommended.

**Case study**

A seven year old girl presented to her GP with moderately severe left sided facial pain. There was no history of trauma or other joint problems, and no other symptoms were reported. On examination the child looked well but had a temperature of 37.8°C. There was no tenderness or swelling evident, but for completeness the GP examined the mouth (no obvious dental abnormalities or oropharyngeal swellings) and ears, which revealed a left-sided middle ear infection (otitis media). Oral amoxicillin was prescribed and regular analgesics and antipyretics recommended.

Four days later the patient went to an Urgent Care Centre with more severe pain localised to the left TMJ, which was tender to the touch. Her ability to open her mouth was severely limited and very painful, but no oral swelling was visible. The presentation was consistent with septic arthritis of the TMJ. Other possibilities included deep facial space infection and reactive synovitis. An MRI scan confirmed a left TMJ effusion (Figure 1).

Under general anaesthetic pus was removed from the joint, which was then washed out. Although culture negative, the presence of streptococci spp. was confirmed with polymerase chain reaction (PCR). The patient responded well to joint irrigation and intravenous antibiotics and made a complete recovery (Figure 2).

Although very rare in the developed world, the complications of otitis media must be remembered and treated aggressively when necessary.
How did you end up in the role?

I am a very hands on person, and love working with children. I was a Montessori teacher for a while, but knew this wasn’t really what I wanted to do. I carried out voluntary work at Great Ormond Street Hospital where I was introduced to Play Specialists, and decided to carry out the training to become one myself. Upon completion I worked at the Royal Marsden Hospital for five years and then moved to the Cromwell where I have been for nine years.

What’s the best thing about being a Play Specialist?

The role of the Play Specialist at Bupa Cromwell Hospital is an interesting and varied one. I work with members of the multi-disciplinary team in different areas of paediatrics, whether to distract a child during a blood test, prepare them for an MRI scan or accompany them to theatre for surgery.

What is the hardest thing about your job?

It is always a challenge when we have patients who don’t speak English or those who find communication difficult generally. There are ways around this; for our international patients we have a great team of interpreters who help make communication smoother, and I have various strategies up my sleeve to overcome those who cannot or who are too scared to communicate.

What is an average day like for you?

I am the sole Play Specialist for the hospital so cover all four areas of paediatrics as well as the satellite areas. My usual hours are 8-4 but I am always flexible as much as possible according to our patients’ needs. Firstly I go to nursing handover on the paediatric Starfish ward and Paediatric Intensive Care Unit to find out the situation of our current inpatients, and if we have any new patients coming in, including children for surgery who I will need to prepare. I liaise with the nurses in paediatric outpatients and the ward to see which patients are having blood tests or dressing changes so I can provide distraction therapy to help them through the procedures. I also allocate time for our long-term patients as part of their daily plan, as well as anything else I’m called on to do.

What advice would you give to someone hoping to follow in your footsteps?

If you have a positive, energetic, easy going, flexible attitude and are able to rise to various challenges, which are sometimes presented at short notice, you would love this job. Even when preparing children for various scary procedures, my main aim is to make the child’s hospital experience as smooth and fun as possible.
Acquired Torticollis in Children

The open door policy of General Practice presents great challenges on a daily basis. Amongst the myriad cases of minor illness and trauma, recognition of early warning signs is crucial, as rapid deterioration in undiagnosed serious pathology remains a great concern.

Torticollis, although most commonly a benign condition, can be the first indication of a more serious disorder. Its name derives from the Latin for twisted (tortus) and neck (collum), and patients present with a lateral inclination of the head and turning of the chin away to the other side. Torticollis is rare in paediatrics and can be caused by many conditions. Furthermore the differential diagnosis is different for infants than for children and adolescents. This might explain the lack of coherent management and instances of a default ‘wait and see’ strategy, which can lead to delays in treatment of life-threatening conditions.

Congenital muscular torticollis associated with a contracture of the sternocleidomastoid muscle is the most common cause of torticollis in infants, and is found in 0.3-2.0% of all live births. The condition of 90% of infants with congenital muscular torticollis improves with manual cervical stretching and is not covered further here.

Acquired paediatric torticollis however requires a different, systemic approach which considers multiple causes as guided by patient history and examination. Ocular, neurogenic, inflammatory, respiratory, traumatic and toxicological pathologies may all be implicated, and it is crucial that a clinical lead is identified to take overall control of management until a cause is found.

Children’s cervical spines are at particular risk to trauma as the upper cervical bones and joints are intrinsically unstable. Articular facets would have little stability if it were not for their capsuloligamentous attachments, so children younger than eleven are more likely to suffer injuries to the upper cervical spine. Even the slightest trauma on history should raise suspicion of underlying atlanto-axial subluxation, dislocation or other musculoskeletal abnormality.

Torticollis occurs as a sequel of trauma, it should be managed as Cervical Spine Injury. Certain genetic conditions can be associated with atlantoaxial instability (AAI) and in Down Syndrome it has been reported at 10-30%. Torticollis is rare in children with Down Syndrome.

Oral and oropharyngeal inflammation is Grisel’s syndrome. Other torticollis presentations occur secondary to rheumatoid arthritis and upper respiratory and soft tissue infections of the neck, even without AAI. This includes retropharyngeal abscesses, a potentially life-threatening condition most commonly seen in children aged 2-4.

Torticollis may be the first presenting symptom of a posterior fossa tumour, thought to be the most frequently encountered neurogenic cause, and patients with ocular pathology may tilt their heads to compensate for diplopia. Other rare causes include spinal infection (osteomyelitis, discitis, abscess), juvenile idiopathic arthritis (JIA) and idiopathic spinal cord injury, which is rare in children.

The wide differential diagnoses demand a structured approach to the management of acquired torticollis, the importance of history and examination cannot be overstated. It is not acceptable to reassure the more acute oriented diagnosis of torticollis and equate this to a benign muscle spasm. In particular the presence of any of the following red flags should prompt urgent referral:

- Any associated trauma.
- Problems with vision.
- Other associated symptoms like headaches, vertigo, vomiting.
- Any gait abnormalities.
- Repeated attendances at hospital with persistence of symptoms or duration >7 days.
- Signs of sepsis (fever, lethargy, tachycardia, pallor etc).
- Severe neck pain.

These cases highlight the need for GPs and Paediatric Emergency teams to increase their awareness when dealing with whiplash like manifestations of AAI. This includes retropharyngeal abscesses with ocular pathology and torticollis and avoid delays in appropriate referrals and management.

References

Referrals can be directed to the specialty that deals with the suspected cause, but it may be simpler and more efficient to refer to the paediatric team, especially if you are not sure of the diagnosis. Where a child is assessed in the early stages of torticollis and a benign cause is diagnosed, a follow-up is required within a couple of days to ensure resolution.

The following patients attended the Paediatric Emergency Department with a presenting complaint of torticollis. Both examples are rare but demonstrate the need for a structured approach in this condition.

Patient 1
A twelve year old girl presented with a three week history of gradual onset torticollis. There was no history of trauma, fever or neurological symptoms and she felt well enough to attend school for the first two weeks of the condition. Examination revealed a happy, pain free and cooperative girl without neurological deficit, and torticollis secondary to muscular spasm was diagnosed. She was discharged and re-presented twice further before investigations were arranged. Plain X-ray of the cervical spine was normal and inflammatory markers were moderately raised. She developed anterior uveitis two weeks later.

Figure 1. Sagittal T2-weighted MR images of the cervical spine show an effusion in the anterior atlantoaxial joint suggestive of Juvenile idiopathic arthritis.

Patient 2
A five year old boy presented with a year long history of vomiting, diagnosed as cyclical, which had worsened over the preceding four weeks. Over the course of this period he had been assessed and no neurological deficit was noted. Examination was otherwise unremarkable and an upper GI endoscopy was planned. He developed torticollis four days before presenting for review, where he complained of persistent nausea and headache, although he did not appear distressed. Torticollis was noted and his gait was ataxic. An urgent CT scan was performed and within twelve hours he was undergoing debulking surgery at the regional Paediatric Neurosurgical Centre.

Figure 2 - Unenhanced axial CT image reveals a well-circumscribed midline hyperdense posterior fossa mass, likely medulloblastoma. There is compression of the 4th ventricle with obstructive hydrocephalus, as evidenced by enlargement of the third (arrow) and visualized portions of the lateral ventricles.
Flat feet
These may be flexible or rigid but the former are much more common. The bony arch is not intrinsically stable and needs good ligament and tendon strength to support it. If, when standing on tip-toes, the arch reforms then the foot is flexible. Tight hamstring and calf muscles exacerbate flattening of the arch, and there are similarities between this condition (Sever’s disease) and the better known Osgood-Schlatter’s of the knee. Relative rest is usually enough, once other potential causes and biomechanical abnormalities are ruled out.

Bunions
As a hereditary condition this toe problem can become evident at a young age. If discomfort and shoe difficulties are troublesome enough then surgical correction is very effective, but recovery takes time (particularly for swelling to resolve). It is considered best to avoid surgery before the feet have stopped growing (in case of recurvarture deformity), so very few operations are undertaken before the age of 13. Beyond this age disruption to school exams and sports need to be taken into account if treatment is planned.

Ingrowing toenails
Recurrent infections should prompt blood glucose testing, but most ingrowing nails are problematic through poor cutting technique. Rounding off of corners is best avoided and nails should not be cut too short. If recurrent infections prove resistant to better nail care and antibiotics, then surgery to narrow the offending edge and kill off the root of that part is highly effective.

Osteochondritis
Unusual pain and swelling may be due to osteochondritis, where for uncertain reasons a bone becomes painful through poor blood supply. In the forefoot this usually affects the second toe metatarsal (Frieberg’s infraction). Nearer to the ankle Kohler’s affects the navicula at the top of the arch of the foot.

Injuries in children and adolescents
Injuries to the ankle in children may be bony or ligamentous, just like in adults. The complicating factor is that X-rays show growth zones and these are easily confused for fractures, or alternatively may be the site of injury and overlooked. A visit to Accident and Emergency will sometimes serve to confuse therefore, and fabula and 5th metatarsal injuries are often over treated (with a cast instead of physiotherapy), or dismissed as a sprain. The result is sub-optimal recovery and sometimes problems with chronic pain.

Ligament injuries in children behave exactly like their adult counterparts, with most needing no more than good physiotherapy. Residual symptoms should not be ignored since damage to the joint surface, undiagnosed fractures or ligament insufficiency can all affect children too.

Stress fractures can blight the sporting aspirations of talented youngsters, and are sometimes due to over-training. A helpful diagnosis is helpful and often requires more than an X-ray. An individualised recovery plan, and attention to any biomechanical (or biochemical) predisposition is essential if recurrence is to be avoided. The forefoot: medial shin above the ankle and navicula are areas where pain and swelling should prompt consideration of referral (even if X-rays are normal).
Burns are trauma wounds that disrupt tissue architecture by thermal, electrical, radiation or chemical causes. Burns teams also treat skin injuries that physiologically behave in a similar manner, such as frost bite or complex exfoliative disorders like Toxic Epidermolysis Syndrome or Staphylococcal Scalded Skin Syndrome.

Burns related mortality has decreased over the years due to a better understanding of burn care principles. These include pre-hospital management, fluid resuscitation protocols, early debridement and burn wound closure, improved respiratory support, control of infection and early enteral nutrition.

Burn care is always delivered in a multi-disciplinary fashion that includes the close collaboration between both the pre-hospital and Burns Unit health professionals.

Pre-hospital burn care

1. Stop the burning process and cool the burn wound.
   - Water should be used as the main coolant of burned skin; the benefits of running cool water over burn wounds for up to 20 minutes have been widely documented and include:
     - Decreased mortality.
     - Pain relief.
     - Decreased cell damage.
     - Decreased cell metabolism in hypoxic tissue for greater cell survival.
     - Stabilised vasculature.
     - Reduced edema.
     - Improved wound healing and scar formation.
     - Decreased inflammatory response.

   - Following the cooling of the burn, assessment of the patient potentially requiring hospital admission is performed according to recognised trauma principles like Advanced Trauma Life Support (ATLS) or Emergency Management of Severe Burns course (EMSB). The burns history in these circumstances should include:
     - Type of burn.
     - Time of incident.
     - How did it occur?
     - Associated injuries, risk of inhalation injury.
     - Past medical history.
     - Special circumstances – deliberate self harm or non-accidental.

The type of burn injuries that pre-hospital professionals may face include:
- Scalds: fat and water (Figure 2).
- Flash (Figure 3).
- Flame (Figure 4).
- Contact (Figure 5).
- Chemical (Figure 6).
- Frostbite.
- Burns related skin loss: Toxic Epidermal Necrolysis Syndrome.

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Superficial burns

These are painful, warm and bright pink with a brisk capillary refill as most of the blood and nerve supply of the skin is preserved. Spontaneous resolution within a two to three week period without residual scarring is likely.
in an atraumatic dressing that allows easy inspection and is easy to remove (such as cling film). No creams or ointments should be applied until the burn is assessed in a definitive facility.

3. Referral and transfer.

The suggested minimum threshold for referral into specialised burn care services can be summarised as:

- All burns ≥2% TBSA in children or ≥3% in adults.
- All full thickness burns.
- All circumferential burns.
- Any burn not healed in two weeks.
- Any burn with suspicion of non-accidental injury should be referred to a Burns Unit for expert assessment within 24 hours.

In addition, the following factors should prompt a discussion with a consultant in a specialised burn care service and consideration given to referral:

- All burns to hands, feet, face, perineum or genitalia.
- Any chemical, electrical or friction burn.
- Any cold injury.
- Any unwell/febrile child with a burn.
- Any concerns regarding burn injuries and co-morbidities that may affect treatment or healing of the burn.
- If the above criteria/threshold is not met then continue with local care and dressings as required.
- If the burn wound changes in appearance and there are signs of infection or concerns regarding healing.
- If there is any suspicion of Toxic Shock Syndrome (TSS) then refer early.

Conclusion

Burn management in the pre-hospital environment should include a safe approach to the burns victim, a stoppage of the burns process and cooling of the burn wound with water as first aid. Following assessment of the patient through recognised trauma protocols in case of major burns, the burn injury needs to be assessed in size and depth, and resuscitation fluid started if necessary.

The burn wound needs to be wrapped in cling film and hypothermia must be prevented. Blisters may be aspirated or de-roofed depending on their extension. No creams or ointments that make the burn assessment difficult at the definitive facility.

Any concerns regarding burn injuries and co-morbidities that may affect treatment or healing of the burn.

Any unwell/febrile child with a burn.

If the burn wound changes in appearance and there are signs of infection or concerns regarding healing.

If there is any suspicion of Toxic Shock Syndrome (TSS) then refer early.

Partial thickness burns

These are recognised by the presence of blisters. Partial thickness burns affecting the superficial layers of the dermis will still exhibit a brisk capillary refill, will show small blisters filled with clear protein-rich exudate, and be sensitive, therefore exhibiting potential for spontaneous healing with dressings over a short period of time. Any burn will heal spontaneously for as long as there are enough reservoirs of epidermal cells in the dermal appendages (hair follicles and sebaceous and sweat glands), and an adequate preservation of dermal blood supply. When deeper areas of the dermis or a more extensive thermal burn has been sustained, large areas of coalescent blistering lead to sheets of epidermis separating from the dermis (typical of paediatric scalds - Figure 10).

The involvement of the deepest areas of the dermis due to burn injury will exhibit a sluggish capillary refill; the skin may exhibit a fixed cherry-red staining with poor sensation and a dry dermis. This is typical of deep dermal partial thickness burns (Figure 11).

Full thickness burns

These involve the whole of the epidermis and dermis, together with their blood and nerve supply (Figure 12). These burns will look leathery, brown, and insensate and will not be able to heal spontaneously. They therefore require debridement and skin grafting. Large burns involving more than 10% TBSA in children or more than 15% TBSA in adults require fluid resuscitation and admission to a burns unit. The Parklands formula is considered the gold standard. This provides a 24 hour fluid regime based in the following calculation: 2-4 cc of Ringers lactate X body weight (Kg) X TBSA (%).

Half of the calculated amount is given during the first eight hours following the injury and the other half over the next 16 hours. Paediatric patients are given maintenance fluid with 0.45% Saline and 5% Dextrose in addition to this. The burn wound should be dressed

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We would love to hear from you. Please let us know what you think of the magazine and any topics you’d like to see in the next issue.

Editor
Alex Gaskell
+44 (0)20 7341 8989

Design
Alison Taylor-Smith
+44 (0)20 7460 5598