Assessment and management of Paediatric C-spine injuries

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Approved by:
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See also: **Paediatric major trauma guidelines – imaging in children with trauma / spinal injury** on Microguide > Paediatrics & Neonatology > Paediatrics > A-Z > major trauma paediatric guidelines

To skip straight to the **Aspen collar how-to guide**, click **here**

Background

- Cervical spine injuries in children are rare.
- Use the Canadian C-spine rule to assess risk
- MRI scans for children are not available out of hours. Please discuss on an individual patient basis with on call Radiology Registrar who will involve the Consultant Paediatric Radiologist on call.

SCIWORA - spinal cord injury without radiographic abnormality

- Spinal cord injury without an obvious vertebral column injury.
- Injury will not be seen on plain x-rays or CT.
- Most frequently seen in younger children (especially < 8 years of age), and in the cervical spine. Incidence ranges from 1% to 10% of all spinal cord injuries in children.

Assessment and management **(See pathway on page 3)**

Spinal Immobilisation

Spinal immobilisation carries a potential airway risk, particularly if the child should vomit. All immobilised patients must be triage category ORANGE and should be nursed with close supervision. They must not be admitted to the SSU.

Use manual immobilisation (MILS = manual in-line stabilisation) or apply head blocks and tape.

Hard collars are only to be used in children who have:

- Abnormal neurology
- ABC compromise including serious brain injury / intubated and ventilated / unconscious

In this situation, switch to a two-piece ASPEN collar ASAP.

The child must be co-operative. Any struggling that the child does may increase leverage on the neck and cause instability.

Imaging

Plain x-rays of the C-spine are the imaging modality of choice in children in whom you do not have a strong suspicion of cord or column injury (see next paragraph on p2).

Perform immediate **MRI** of the C-spine if strong suspicion of C-spine cord or column injury as indicated by **dangerous mechanism of injury** (see box 1 on p3.) or **complaining of paraesthesia in upper or lower limbs, and** by **clinical assessment** e.g. abnormal neurological signs and symptoms.

OR, if the child **has sustained a head injury** and has any of the following features – perform immediate **CT** of the C-spine:

- GCS < 13 on initial assessment
- Patient intubated
- Focal peripheral neurological signs
- Paraesthesia in the upper or lower limbs
- Definitive diagnosis of cervical spine injury is needed urgently
- Patient being scanned for multi-region trauma
- Plain X-rays technically difficult or inadequate
- Strong clinical suspicion despite normal x-rays
- X-rays show a significant injury

Clearing the C-spine

Use the pathway on page 3 to clear the C-spine.
Ensure documentation when C-spine clearance occurs.

Paediatric Cervical Spine Injury pathway at RACH & RSCH

(See also **additional guidance for C-spine CT in children with head injuries NICE 176)

History of trauma and:
- **GCS < 15**
- **Unable to assess / uncooperative**
- **Major distracting injury**
- **Major trauma**
- **Intoxicated / drug affected**
- **Focal peripheral neurology**
- **Paraesthesia in the upper or lower limbs**

No → Complaining of neck pain → No

Yes → give oral and / or intranasal analgesia

Yes to any

Dangerous mechanism of injury (see box 1.) OR **Unable to safely assess range of movement in neck** (see box 2.)

Yes → **C-spine immobilise** + Spinal precautions

No → Assess range of ACTIVE neck movements

Proceed to imaging**

Box 1. Dangerous mechanism of injury:
- Fall from height > 1 metre or 5 stairs
- Axial load to head
- High speed MVC, rollover
- Ejection from a motor vehicle
- Accident involving motorised recreational vehicles
- Bicycle collision or pedestrian being struck

Box 2. Safe to assess range of movement in neck – Any 1 of:
- No focal posterior mid-line C-spine tenderness
- Involved in simple rear-end MVC
- Comfortable in sitting position in ED
- Has been ambulatory at any time since injury
- Presents with delayed onset of neck pain

Indication for MRI after Consultant to Consultant discussion:

Dangerous mechanism of injury (see box 1.) **or** paraesthesia in limbs **and** abnormalities on clinical assessment suggesting spinal cord or column injury

Not applicable or not available

3-view C-spine x-rays Lateral / AP / PEG view if can obey commands and open mouth

Can actively rotate neck 45 degrees to left and right?

No → **C-spine immobilise** + Spinal precautions

Yes

Normal → C/o neck pain OR C-spine tenderness OR Neurological deficit OR Unable to assess

Abnormal

Yes →
- Discuss with CED Consultant or Ortho or Spinal Registrar
- Discuss with Paediatric Radiologist to consider CT scan
- Maintain immobilisation and spinal precautions

No → Can actively rotate neck 45 degrees to left and right?

Yes → **Clear C-spine**
- document in notes

What to do if you are unable to clear the C-spine after plain x-rays or CT scan

If the child requires **paediatric Major Trauma Centre (MTC) care** for **multiple injuries or traumatic brain injury,** please **refer to the Southampton and Oxford Retrieval Team** (SORT).

Unable to clear C-spine due to ongoing clinical concerns or abnormal imaging or inability to assess spine

- Maintain immobilisation with MILS or head blocks and tape
- Ensure child has appropriate analgesia

Discuss child with:
In hours – UHSussex Spinal team (via switchboard)
Out of hours – Orthopaedic Registrar (bleep 8629)

If the above does not resolve the issue, or child requires out of hours MRI scanning in order to clear spine, **discuss with the University Hospital Southampton Paediatric Neurosurgery service** and complete a written referral via **https://www.referapatient.org/Home/Index**

Apply two-piece ASPEN C-spine collar as soon as possible

See how-to guide on page 5

- Maintain C-spine immobilisation precautions
- Log roll / 20 degree tilt if vomiting or requires toileting

If requires admission:

- Admit to the paediatric critical care unit
- Joint care with Paediatric Surgery

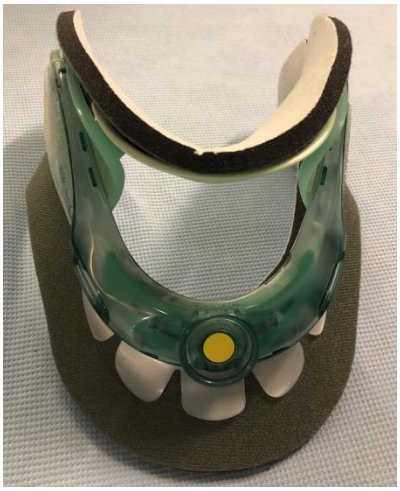
Contacts

RSCH Spinal team: via switchboard
Southampton and Oxford Retrieval Team (SORT): 023 80775502
University Hospital Southampton Neurosurgical team: 02380777222

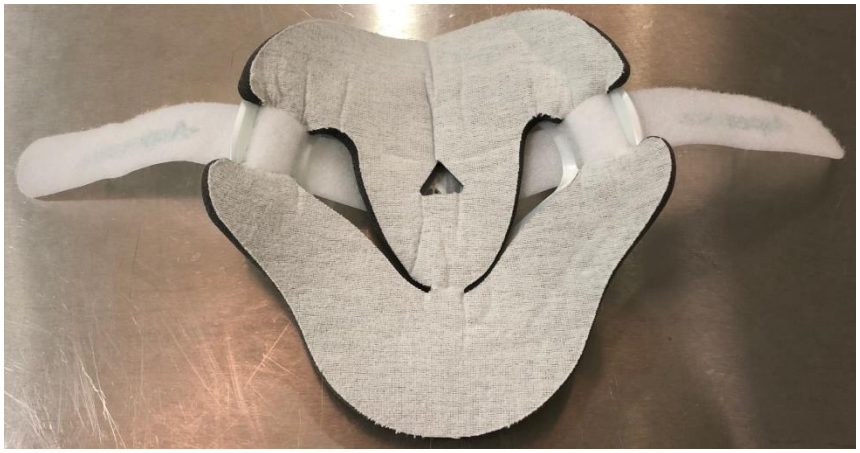
Two-piece (Aspen) collar how-to guide

- Aspen collars come in a single size which is suitable for patients down to 26 kg
- They come in two pieces and need fitting together as part of the application process and on the child, rather than before applying.

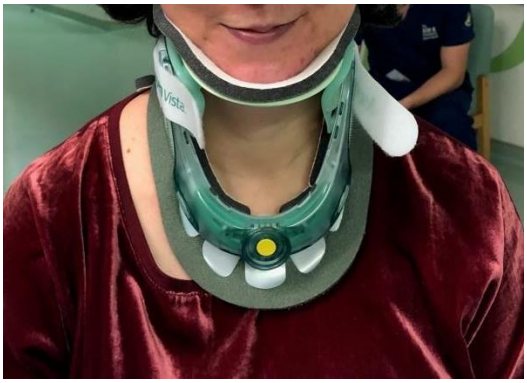
Front piece:



Back piece:

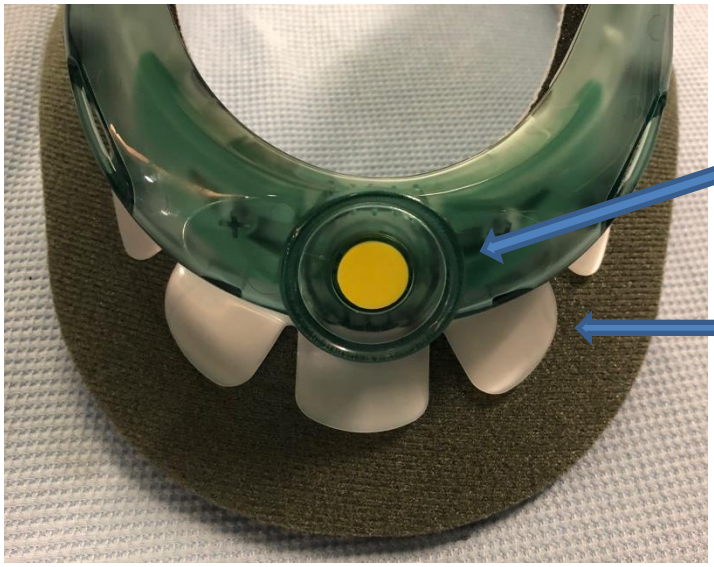


When completed, the collar should fit like the pictures below:



Step 1: Slide the back piece down and under the neck. The straps should sit equidistant and just above the shoulders

Step 2: Take the front piece and fold up the plastic flanges at the front. The will make it more comfortable when it is on.



Step 3: Fit the front piece down onto the back piece. Push the edges of the front piece where the Velcro is in and angled upwards, behind the ears.

Step 4: Do up the Velcro very tight

Step 5: Push the green part of the front of the collar against the chest to steady it, and pull out the yellow and green button

Step 6: Turn the yellow and green button clockwise to tighten and fit the collar to size. The child should be able to open their mouth a little.

If the child is allowed to sit up, the collar will need tightening via the yellow and green button, as it will loosen due to a change in shoulder position.

See this video for a visual guide to applying the collar (HD video. If you are having difficulty viewing the video, click here).

Once the collar is on, it will need to be taken off and washed down as required e.g. if the child vomits or significant food spills.

Any questions about application should be directed to the nurse in charge in CED.