Paediatric Clavicle Fractures: Are Radiographs Required?

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Background

Clavicle fractures are common, accounting for up to 15% of paediatric fractures. Most affect the middle third of the clavicle and do not require surgical intervention or follow-up in fracture clinic. Current practice is to x-ray clinically suspected fractures, although most can be diagnosed clinically, present a low risk of complications and are treated conservatively with analgesia and a broad arm sling.

Selective radiography of the small proportion of children with clavicle fractures who are at higher risk of complications and may require surgical intervention would reduce unnecessary exposure to radiation, improve patient journey and be beneficial economically.

Aims

The aim of this project was to determine whether:

- radiological confirmation of clinically diagnosed clavicle fracture influences patient management
- we can be selective in our use of radiography rather than x-raying all clinically suspected fractures
- a clinical decision tool can be developed to help identify children with high risk fractures who may require an x-ray

Methodology

This quality improvement project involved a review of the literature and a retrospective review of children aged 1-15 years who presented to Sheffield Children’s Hospital (SCH) Emergency Department (ED) with a clinically suspected clavicle fracture.

Two groups of children were reviewed:

- The first, children who presented between 1/1/12 – 31/12/12 with a clinically suspected clavicle fracture confirmed on x-ray.
- The second, children who presented between 1/3/12 – 31/3/13 who were diagnosed with a clavicle fracture and managed operatively.

The clinical features, radiological features and management outcomes of the patients were reviewed.

Results of retrospective data review

<table>
<thead>
<tr>
<th>Management of children with clavicle fracture at SCH</th>
<th>1/1/12 – 31/12/12</th>
<th>1/3/12 – 31/3/13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservative Surgical</td>
<td>96 (99)</td>
<td>711 (98.6)*</td>
</tr>
<tr>
<td>Surgical</td>
<td>1 (1)</td>
<td>2 (0.4)</td>
</tr>
<tr>
<td>N/A</td>
<td></td>
<td>98 (1.4)</td>
</tr>
</tbody>
</table>

*skin number is an estimate
3/711 (0.4%) children with clavicle fracture required surgical intervention. In one case the need for surgical intervention was clinically identifiable due to the presence of skin tenting, with radiography used as an adjunct to guiding treatment.

Plain radiography was negative in the other two cases treated surgically, computed tomography confirming the clinical suspicion of proximal clavicle fracture with sternaloclavicular joint displacement in both.

Figs 1 and 2 show the age distribution and fracture site.

Discussion & Conclusion

The vast majority of clavicle x-rays do not influence the management of children with clavicle fracture; clinical criteria have been developed that identify the small proportion who may require surgical treatment and may benefit from plain radiography.

Application of the clinical indicators for x-ray would reduce the number of unnecessary x-rays by an estimated 56%, minimising exposure to radiation and resulting in a cost saving of £5184 per year for Sheffield, which extrapolates nationally to a reduction of £2,608,348 per year.

The literature review identified the following clinical features as being associated with high-risk fractures:

- Open fracture
- Nerve injury
- Vascular injury
- Markedly displaced or angulated fractures with compromised skin integrity
- Extreme medial fractures
- Extreme lateral fractures
- Older age/mid-teenage years

Following discussion it was decided that:

- children under 2 years should continue to be x-rayed so as not to miss potential non-accidental injuries
- children ≥ 13 years should continue to be x-rayed as the risk of fracture complication increases with age

Applying these clinical criteria retrospectively to all children who had a clavicle x-ray in 2012, only 75/171 (44%) would have been x-rayed. It is estimated that 3/42 (7%) of children ≤ 13 years that were x-rayed and did not have a fracture would have had an x-ray according to the new criteria, based on the point of tenderness. Only 4/15 of the patients who were referred to fracture clinic would have required follow-up according to the new criteria.

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