Improving emergency department management of paediatric clavicle fractures: a complete audit cycle

A protocol was devised to address the issue of unnecessary attendance at fracture clinic by children who have a fracture of the clavicle that is deemed to be uncomplicated. For the purposes of this protocol, the clavicle was divided into three zones. Fractures of the middle clavicle for which displacement was minimal, heal quickly in the majority of cases, without the need for follow up. As a result these children can be discharged provided the parents are adequately advised. This article outlines a study which investigated the effectiveness of the protocol. The study found that implementation of the protocol reduced unnecessary attendance at clinic from 85% (47/55) to 17% (4/23). This resulted in cost savings to the trust and reduced the pressure on staff working in busy fracture clinics.

Introduction

A fracture of the clavicle is a common paediatric injury, presenting in emergency departments across the UK (Cross et al, 2010). Historically, these fractures in children have been managed through non-operative means, largely because of the low incidence of complications arising from managing them conservatively (O'Neill et al, 2011). This is in keeping with the attitude of clinicians as far back as Hippocrates, who believed that clavicle fractures required little more from the physician than benign neglect (Adams, 1985).

More recently, Calder et al (2002) have gone so far as to suggest that attendance at fracture clinic had little or no impact on the outcome of isolated clavicle fractures in children. In their retrospective series of 286 children sustaining an isolated clavicle fracture, Calder et al (2002) found that 83% of patients had follow-up appointments in fracture clinic and 6% repeat radiographs. These additional clinic appointments and radiographs did not alter the subsequent management of patients. This implies that the requirement that children attend fracture clinic after sustaining such a fracture amounts to an inappropriate use of resources for the NHS, and a waste of time both for the clinician and the patient.

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In order to address the large numbers of children being referred for unnecessary fracture clinic appointments the authors sought to introduce a new clinical pathway.

For the purposes of this clinical pathway, the clavicle was divided into three zones. Zone 1 refers to the medial fifth of the clavicle, zone 2 refers to the middle three-fifths of the clavicle and zone 3 refers to the lateral fifth. According to Allman (1967) all medial (zone 1) and lateral (zone 3) fifth fractures should be referred immediately as they are uncommon and often generated from high energy injuries. However, Allman (1967) also suggested that uncomplicated fractures in the middle three-fifths (zone 2) can be discharged safely provided that the parents are aware of the possible complications and are aware of the need to bring their child back to fracture clinic should these occur. *Figure 1* gives more information on the protocol.

Study

Aim

This study assessed the impact of this clinical pathway upon the referral rate to fracture clinic of paediatric patients with clavicle fractures.

Method

A new clinical pathway (*Figure 1*) was drawn up in June 2011 by the orthopaedic department for management of fractured clavicles in children aged 1–16 years old. In an effort to measure the effectiveness of the protocol the authors sought to measure the number of children being seen in fracture clinic with a zone 2 clavicle fracture as evidence suggests that uncomplicated cases can be discharged safely. A retrospective review of cases seen in the emergency department was performed once a suitable process of engagement, education and computer software modification had taken place.

The process of education involved organizing formal teaching sessions for emergency nurse practitioners and senior house officers. During these teaching sessions, the staff were made aware of the pre-intervention audit results and the implications of these results, and were taught how to use the new clinical pathway.

Changes were also made to the emergency department computer coding software, so that the clinical pathway appeared as an 'aide-memoir' when a practitioner was coding for a paediatric clavicle fracture.

The retrospective review took place via the emergency department coding system. Inclusion criteria were patients under 16 years of age who were coded as having clavicle fractures between October and December 2012. Patient demographics were recorded, the fracture site was classified, and the treatment and discharge information was obtained. The clinical results were audited against the protocol as the gold standard. These data were also compared to a similar group treated before the protocol was in use between June 2011 and March 2012.

Results

Pre-intervention results

A total of 63 patients were included, with a mean age of 8.6 ± 4.4 years. Of these, one patient did not have a fracture and had been incorrectly coded. Following

classification of each fracture in accordance with local protocol, 89% (55/62) of fractures were found to be located in zone 2. Of these patients, 11% (6/55) were discharged with no follow up, 4% (2/55) were admitted and 85% (47/55) were referred to fracture clinic. Only 15% (9/62) of patients were provided with written instructions on the care and prognosis of their injury.

Figure 1. Protocol for the management of fractured clavicles in children aged 1–16 years.

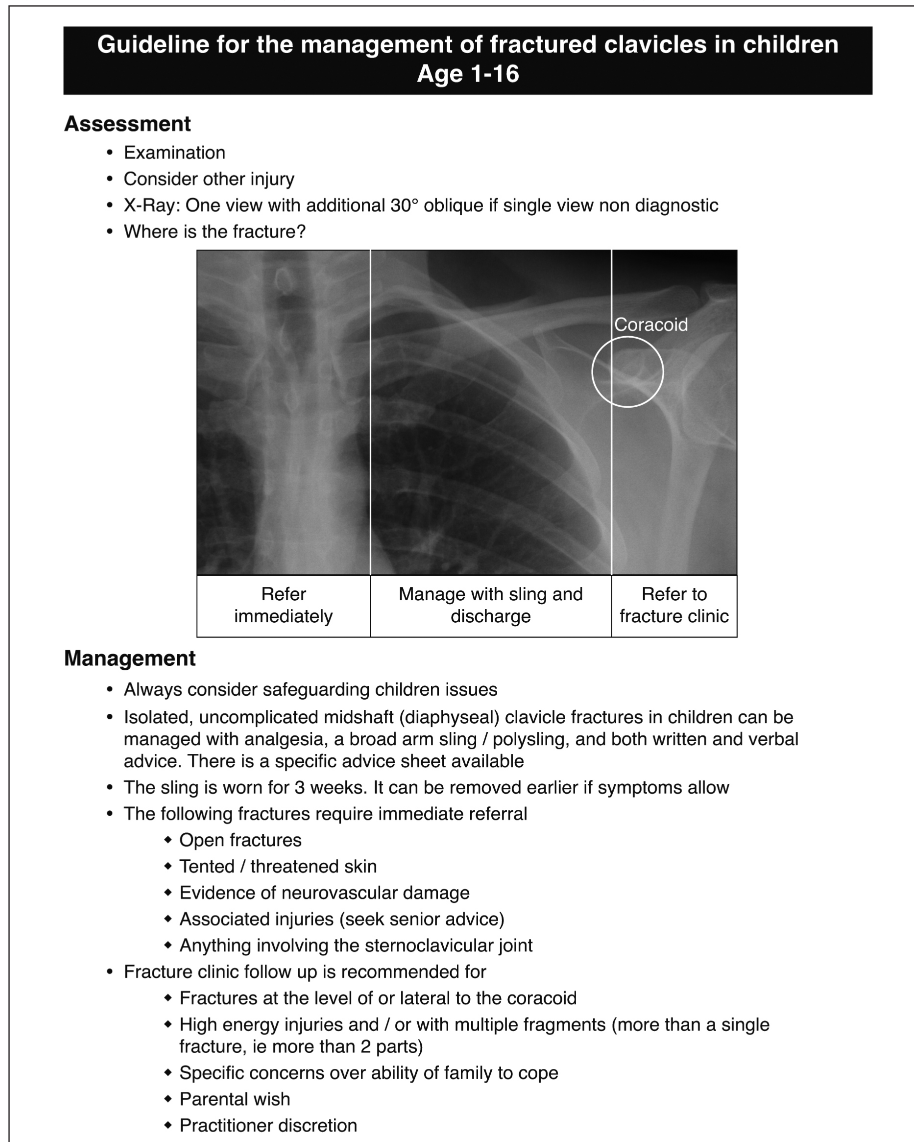

Table 1. Results of the study

	Pre-intervention results	Post-intervention results
Patients	63	24
Mean age (years)	8.6	7.8
Frequency of zone 2 fractures	55/63	23/24
Referral to fracture clinic	47/55 (85%)	4/23 (17%)
Admissions	2/55 (4%)	1/23 (4%)
Discharges	6/55 (11%)	18/23 (78%)
Provision of written information	9/62 (15%)	10/23 (43%)

Post-intervention results

Following the implementation of changes, a second audit was performed in which 24 patients satisfied the inclusion criteria, with a mean age of 7.8 ± 4.9 years. Again one of the 24 patients did not have a fracture, and had been incorrectly coded. Following radiological classification of the fracture site, all fractures were located in zone 2. A total of 78% (18/23) were discharged without further follow up, 17% (4/23) were referred to fracture clinic and one was admitted to hospital. There was also an improvement in the information given to patients; 43% (10/23) of the patients were given written advice regarding return to normal and sporting activities.

Table 1 gives a summary of the results.

Discussion

This study has shown that a protocol can streamline the clinical pathway of children under 16 years old who have sustained a clavicle fracture. Following the implementation of changes, a 24-case re-audit showed fewer unnecessary referrals to fracture clinic (17% *vs* 85%) and improvements in the number of parents being given written advice (43% *vs* 15%). To try and extrapolate these figures to measure the effect on a trauma service, the authors investigated the effect if all 47 of the zone 2 patients from the pre-intervention group seen in fracture clinic were not followed up. Beiri et al (2006) found that the average time to review one patient in a routine outpatient fracture clinic was 11 minutes. Using this figure, the authors could potentially save at least 10 hours of fracture clinic time over the course of a year, resulting in potential cost savings to the NHS.

The incidence of complications following isolated childhood clavicle fractures is very low (Calder et al, 2002; O'Neill et al, 2011). A total of 18 parents from the post-intervention group were interviewed at a minimum of 6 months after the injury. In the authors' experience, clavicle fractures in children heal quickly, as demonstrated by the absence of pain and the return of full function. In the post-intervention group all 18 patients were back to normal activities and reported no residual shoulder pain. This shows a similarly low rate of complications.

The majority of parents interviewed were satisfied with the treatment their children had received and 78% were pleased to not

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have been required to attend fracture clinic after discharge from emergency department. Despite the majority of parents being satisfied with their child's management, 22% of parents would have liked a follow-up appointment in fracture clinic. This could be because parents inevitably worry about their children when they are ill (Kai, 1996), but their concerns may reflect lay beliefs and their interpretation of medical knowledge. Interestingly the results of this study support this argument as all 22% of parents who would have liked a follow-up appointment positively correlated with the patients who were not given written advice at the time of their injury. This represents the loss of an opportunity to reassure patients.

Before this intervention and reaudit took place, a patient information sheet had been produced by the orthopaedic department and made available for parents of children with clavicle fractures in the emergency department. The results of the current study indicate that the provision of this parental sheet was poor, with less than half of patients being issued it, despite emergency department clinicians being educated about its availability. This could reflect the presence of resistant attitudes to change existing within the department. Importantly this did not negatively affect the patient's ability to achieve a satisfactory clinical outcome. However, the provision of such information is essential to ensure patient compliance with management.

Alder et al (2004) suggested that knowledge is important for patients to understand and make decisions about health-relevant messages. A parent who may be under time pressure or may be unable to understand the medical terms being used may decide on the basis of what they feel about the message. For instance anxious parents may decide that their child's ailment is not being taken seriously which can ultimately lead to patients becoming dissatisfied with the service.

Following this study, in an effort to improve the rate of provision of written information the authors arranged an informal team briefing with a group of consultant emergency department physicians. During this meeting the importance of providing written information was explained. The authors chose to educate these individuals as they have a high level of interest and power within the culture of the organization. The aim was to communicate the right information to the right people in an effort to convince the majority of the emergency department team to adopt the change in practice.

The implementation of the clinical pathway was not without fault, with 17% of patients being referred to fracture clinic unnecessarily. This may be explained by the introduction of new junior doctors and nurse practitioners who lacked the experience of the definitive treatment of simple trauma (Bhandari, 2009). In an attempt to ensure patients get the right care, it is vital that all new staff are adequately trained about the existence of clinical care pathways. Most of these are available on a hospital-based computer system. However, from experience it appears that these pathways are largely ignored by staff unless they are formally taught about the pathways and their use. The orthopaedic department in the authors' district hospital has agreed to hold formal teaching sessions annually in an effort to improve emergency department staff compliance with clinical pathways and ensure patients get the most appropriate care.

Limitations of the study

This was a retrospective study reviewing radiographs and electronic clinical records which brings in an inherent bias. The emergency department coding system does not provide the interrogating user with a thorough account of the consultation. In addition the hospital fracture clinic has a number of sources of referral of which its own emergency department is only one. There are many other surrounding minor injury units whose patients were not included in this study. The small number of patients involved in this study limits the generalisability of the findings.

Conclusions

The large number of children being seen in fracture clinic represents a significant workload. The results have shown standardization of care, fewer unnecessary appointments for patients and potential cost savings to the NHS. This article recommends that children who sustain a clavicle fracture should be managed according to this local protocol where the majority of cases can be safely discharged from further follow up. The provision of both verbal and written information is necessary for patients to process the health messages and is an opportunity for clinicians to reassure patients and ensure patient compliance. **BJHM**

Conflict of interest: none.

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LEARNING POINTS

- A fracture of the clavicle is a common paediatric injury with a low incidence of complications.
- Attendance at fracture clinic has no impact on the outcome of isolated fractures of the clavicle in children.
- A protocol was devised to address issue to unnecessary attendance at fracture clinic by children who have a fracture of the clavicle which is deemed to be uncomplicated.
- Following the implementation of this protocol, a 24-case re-audit showed fewer unnecessary referrals to fracture clinic.
- This resulted in standardization of care, fewer unnecessary appointments and potential cost savings to the trust.

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