Towards evidence based emergency medicine: best BETs from the Manchester Royal Infirmary

Edited by S D Carley

Best evidence topic reports (BETs) summarise the evidence pertaining to particular clinical questions. They are not systematic reviews, but rather contain the best (highest level) evidence that can be practically obtained by busy practising clinicians. The search strategies used to find the best evidence are reported in detail in order to allow clinicians to update searches whenever necessary. Each BET is based on a clinical scenario and ends with a clinical bottom line which indicates, in the light of the evidence found, what the reporting clinician would do if faced with the same scenario again. The BETs published below were first reported at the Critical Appraisal Journal Club at the Manchester Royal Infirmary or placed on the BestBETs website. Each BET has been constructed in the four stages that have been described elsewhere. Four BETs are included in this issue of the journal.

- Transthoracic ultrasonography to diagnose pneumothorax in trauma
- Early mobilisation for volar plate avulsion fractures
- Do we need to give steroids in children with Bell's palsy?
- Topical anaesthetic versus lidocaine infiltration to allow closure of skin wounds in children

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Transthoracic ultrasonography to diagnose pneumothorax in trauma

Report by Usman Jaffer, Senior House Officer
Search checked by Duncan McAuley, Special Registrar
doi: 10.1136/emj.2005.026542

Abstract
A short cut review was carried out to establish whether transthoracic ultrasound can be used to diagnose pneumothoraces in trauma patients. A total of 46 papers were found using the reported search, of which four represented the best evidence to answer the clinical question. The author, date and country of publication, patient group studied, study type, relevant outcomes, results, and study weaknesses of these best papers are tabulated. A clinical bottom line is stated.

Clinical scenario
A 35 year old male is brought into the emergency department after falling from a height. He is tachypnoeic and tachycardic and has tenderness in the left anterior chest and left upper abdomen. Your department has an ultrasound scanner and this is used to assess the patient’s abdomen. You wonder whether it could also be used to diagnose a pneumothorax.

Three part question
In a [patient with chest trauma] can [transthoracic ultrasonography] accurately diagnose [a traumatic pneumothorax].

Search strategy
Medline 1951 to December 2004 using the Dialog Datastar interface. [(pneumothorax#W.DE OR pneumothorax) AND (ultrason*$12) AND (wounds.and.injuries#W.DE. OR trauma)]

Editor’s note: In OVID Medline an equivalent search strategy would be: [exp pneumothorax/OR pneumothorax.mp] AND [ultrason*$12.mp] AND [exp wounds and injuries/OR trauma.mp]

Search outcome
Altogether 46 papers were found of which four were relevant to the three part question (table 1).

Comments
These studies were relatively small and only two were obviously blinded. Sensitivity for pneumothorax reported varied between 58.9% and 100% and specificity varied between 94% and 100%. It is interesting to note that the study with the lowest sensitivity used CT as part of the gold standard. In such cases CT may be able to find small pneumothoraces not visible on CXR. The clinical relevance of such small pneumothoraces in the resuscitation room is debatable (unless intermittent positive pressure ventilator (IPPV) is being considered). All ultrasound examinations are known to be operator dependent. There is some variation in the ultrasonographic signs used to confirm pneumothorax.

- CLINICAL BOTTOM LINE
Rapid and accurate bedside ultrasound performed by emergency physicians can be used to diagnose pneumothorax after chest trauma. The clinical role of this in the resuscitation of trauma patients is not clear.

Table 1

<table>
<thead>
<tr>
<th>Author, date, and country</th>
<th>Patient group</th>
<th>Study type (level of evidence)</th>
<th>Outcomes</th>
<th>Key results</th>
<th>Study weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dulchavsky SA et al, 2001, USA</td>
<td>382 stable surgical patients (95% post-traumatic)</td>
<td>Prospective diagnostic study</td>
<td>USS v CXR diagnosis</td>
<td>Sensitivity 95% (89–95) Specificity 100% (99–100)</td>
<td>Only stable patients recruited. CXR used as gold standard</td>
</tr>
<tr>
<td>Kirkpatrick AW, Liu D, et al, 2002, Canada</td>
<td>27 patients sustaining blunt chest trauma who had CT scans</td>
<td>Prospective blinded diagnostic study</td>
<td>USS v CT diagnosis</td>
<td>Sensitivity 100% (82.6–100) Specificity 94% (82–94)</td>
<td>May have selection bias for large pneumothoraces. Small numbers</td>
</tr>
<tr>
<td>Knudston JL et al, 2004, USA</td>
<td>328 consecutive trauma patients</td>
<td>Prospective diagnostic study</td>
<td>USS v CT diagnosis</td>
<td>Sensitivity 92.3% (74.4–97.9) Specificity 99.7% (98.9–99.9)</td>
<td>CXR used as gold standard. Not clearly blinded</td>
</tr>
<tr>
<td>Kirkpatrick AW et al, 2004, USA</td>
<td>225 trauma patients</td>
<td>Prospective diagnostic study</td>
<td>USS v CT diagnosis or escape of air on thoracostomy</td>
<td>Sensitivity 58.9% (45.0–71.9) Specificity 99.1% (97.6–99.8)</td>
<td>Unclear if CT radiologists blinded to USS</td>
</tr>
</tbody>
</table>

CT, computed tomography; CXR, chest radiograph; USS, ultrasound

Early mobilisation for volar plate avulsion fractures

Report by Richard Body, Clinical Research Fellow
Checked by Craig J Ferguson, Clinical Research Fellow
doi: 10.1136/emj.2005.026559
A short cut review was carried out to establish whether rest or mobilisation is best for volar plate avulsion fractures. A total of 73 papers were found using the reported search, of which two were relevant to the three part question (Table 2).

Clinical scenario
A 30 year old man presents to the emergency department a few hours after a hyperextension injury to his index finger. A radiograph demonstrates an avulsion fracture at the volar plate of the proximal interphalangeal joint. You wonder whether splintage or early active mobilisation will lead to a better functional outcome.

Search strategy
OVID Medline 1966–September 2004. (volar plate.mp. OR Fingers/ OR exp Finger Joint/ OR proximal interphalangeal joint.mp. OR PIP joint.mp.) AND (exp Fractures/OR exp Fractures, Closed/) AND (exp Early Ambulation/OR mobilisation.mp. OR exp Immobilization/OR strapping.mp. OR splint$.mp.) LIMIT to human and english language.

Clinical question
In [adults with volar plate avulsion fractures] does [early mobilisation or splintage] lead to [superior functional outcome]?

Three part question
In [adults with volar plate avulsion fractures] does [early mobilisation or splintage] lead to [superior functional outcome]?

Comment(s)
There is a range of opinions about the optimal treatment for small, stable volar plate avulsion fractures. Some advocate immobilisation with aluminium splints, others advocate neighbour strapping and yet others advocate early active mobilisation. Unfortunately there are no randomised controlled trials to compare the efficacy of these interventions. The two trials that were identified suggest that early mobilisation leads to acceptable functional outcomes, which may be at least as good as following immobilisation.

There is no evidence of harm following early mobilisation. However, the available evidence is insufficient to make an evidence based recommendation for early active mobilisation instead of splintage.

CLINICAL BOTTOM LINE
There is insufficient evidence to give firm recommendations whether mobilisation or splintage is best. Local guidelines should be followed.


Do we need to give steroids in children with Bell’s palsy?

Report by Chetan Sandeep Ashtekar, Specialist Registrar
Checked by Manohara Joishy, Specialist Registrar, and Rohit Joshi, Clinical Observer
doi: 10.1136/emj.2005.026567
Abstract
A short cut review was carried out to establish whether steroids are indicated in children presenting with Bell’s palsy. A total of 60 papers were found using the reported search, of which three represented the best evidence to answer the clinical question. The author, date and country of publication,
patient group studied, study type, relevant outcomes, results, and study weaknesses of these best papers are tabulated. A clinical bottom line is stated.

**Three part question**

In [children with Bell’s palsy] does [giving oral steroids] [hasten recovery]?

**Clinical scenario**

You have been called to the emergency department to see a 6 year old boy with acute onset of weakness on the left side of the face. You diagnose it to be Bell’s palsy. You wonder if there is any evidence to use steroids in this situation.

**Search strategy**


**Search outcome**

Cochrane: three systematic reviews, one relevant (included only one RCT in children). PubMed: one RCT and one systematic review (included only one RCT in children). Limits excluding RCT: 60 hits, of which only one was directly relevant (table 3).

**Comment(s)**

Bell’s palsy (acute idiopathic facial nerve palsy) is a non-life-threatening disorder with important functional and psychosocial effects.1–3 The aetiology of Bell’s palsy remains unclear, but many consider it to be a reactivation to viral inflammation rather than ischaemia.4 Diagnosis depends on exclusion of known causes of facial palsy such as hypertension, trauma, tumour, acute otitis media, chronic ear disease, and chronic systemic neurological and metabolic disorders.5–7 The natural history of Bell’s palsy in children is thought to be benign with a tendency towards complete resolution in many cases within two months of the onset of the facial paralysis and by six months in most cases.8 However corticosteroids have been widely used in the treatment of Bell’s palsy, as it is believed to decrease the inflammation and oedema of the nerve sheath. Although many uncontrolled paediatric studies and case series suggested that steroids are beneficial, especially in cases with complete facial paralysis,9 other studies showed no benefit in the final outcome.10,11 We found only one randomised controlled trial done exclusively in children. This study reported a recovery rate of 80–90% in the first six months of the disease, which reached 100% by 12 months irrespective of the use of steroids.12 A recent systematic review found no positive evidence for the beneficial effects of

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**Table 2**

<table>
<thead>
<tr>
<th>Author, date, and country</th>
<th>Patient group</th>
<th>Study type (level of evidence)</th>
<th>Outcomes</th>
<th>Key results</th>
<th>Study weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phair IC et al, 1989, UK</td>
<td>74 consecutive patients who had sustained a volar avulsion fracture at the PIP joints (size not greater than 2 x 2 mm) and attended for review between 6 and 24 months after injury. Patients with radiological subluxation were excluded.</td>
<td>Retrospective comparative study</td>
<td>Time to regain normal range of movement (weeks)</td>
<td>Mean 5.7 in neighbour strapping group (range 1–16); mean 8.9 in splintage group (range 2–24)</td>
<td>Retrospective</td>
</tr>
<tr>
<td>42 were treated by immobilisation in 30° flexion with an aluminium splint for 1–7 weeks (average 3.1 weeks) and 32 were permitted to mobilise by neighbour strapping for 1–6 weeks (average 2.8 weeks)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to regain normal use (weeks)</td>
<td>Mean 6.8 in neighbour strapping group (range 2–24); mean 10.9 in splintage group (range 3–52)</td>
<td></td>
<td></td>
<td>Not planned interventions; patients seemingly assigned to different treatment groups at the initial treating surgeon’s discretion, no randomisation</td>
<td></td>
</tr>
<tr>
<td>Functional outcome (excellent, good, or poor)</td>
<td>31 (96.6%) “excellent” in neighbour strapping group vs 39 (93%) in splintage group</td>
<td></td>
<td></td>
<td>No statistical analysis</td>
<td></td>
</tr>
</tbody>
</table>

| Gaine WJ et al, 1998, UK | 192 consecutive patients seen in the hand clinic with volar plate avulsion fractures. Joint dislocations and unstable joints were excluded. 162 patients (with 166 fractures) were followed up for at least 1 year and were included in the analysis. | Prospective interventional trial | Functional outcome (excellent, good, poor, or fair, assessed by an independent examiner) | 142 patients (88%) reported excellent outcome (full range of pain free movements); 17 patients (10%) reported good outcome (average 10 degrees PIP joint deformity), 3 patients fair result (intermittent pain and swelling) | Not a controlled trial |
  | 90 patients with fractures were randomised into two groups: 45 in splintage group (range 2–24); mean 10.9 in splintage group (range 3–52) | | | | Discrepancy with numbers: 162 patients with 166 fractures, but only 3 patients had 2 fractures |
  | 105 patients were randomised into two groups: 53 in splintage group (range 2–24); mean 10.9 in splintage group (range 3–52) | | | | Some patients also received ultrasound therapy but this was not standardised |
  | 31 (96.6%) “excellent” in neighbour strapping group vs 39 (93%) in splintage group | | | | Only small fractures analysed but no mention of large fractures being excluded or acceptable objective size of fracture for inclusion |

**PIP**, proximal interphalangeal.
corticosteroids in Bell’s palsy. Therefore they concluded that the routine use of corticosteroids for the treatment of paediatric Bell’s palsy is not recommended. Clearly there is a need for a well designed, adequately powered, multicentre randomised controlled trial to evaluate this issue.

► CLINICAL BOTTOM LINE

Currently there is no evidence to recommend the use of corticosteroids for the treatment of Bell’s palsy in children.


REFERENCES


Topical anaesthetic versus lidocaine infiltration to allow closure of skin wounds in children

Report by Craig Ferguson, Clinical Research Fellow, and Ben Loryman, Specialist Registrar Checked by Richard Body, Clinical Research Fellow doi: 10.1136/emj.2005.026575

Abstract

A short cut review was carried out to establish whether topical anaesthetics are an acceptable alternative to lidocaine infiltration in children. A total of 54 papers were found using the reported search, of which seven represented the best evidence to answer the clinical question. The author, date and country of publication, patient group studied, study type, relevant outcomes, results, and study weaknesses of these best papers are tabulated. A clinical bottom line is stated.

Three part question

In [children presenting with a minor skin laceration requiring suturing] is [topical anaesthetic as effective as...?
### Table 4

<table>
<thead>
<tr>
<th>Author, date, and country</th>
<th>Patient group</th>
<th>Study type (level of evidence)</th>
<th>Outcomes</th>
<th>Key results</th>
<th>Study weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pryor GJ et al, 1980, USA</td>
<td>158 patients presenting to the emergency department with minor lacerations. Topical TAC versus lidocaine infiltration for anaesthesia</td>
<td>PRCT</td>
<td>Acceptability of application of anaesthetic</td>
<td>TAC was thought to be more acceptable in children under 17 yrs (p=0.0001), no significant difference in feasibility</td>
<td>Few baseline data about patient group. Some data presented in graph form or percentage only with significance mentioned in accompanying text</td>
</tr>
<tr>
<td>Anderson AB et al, 1990, USA</td>
<td>107 children between 3 and 16 yrs presenting to the emergency department with wounds less than 4 cm requiring suturing</td>
<td>PRCT</td>
<td>Pain score on application of anaesthetic</td>
<td>Infiltration of lidocaine significantly more painful than application of TAC (p=0.001)</td>
<td>No mention of wound site. No breakdown of different age groups of children</td>
</tr>
<tr>
<td>Hegenbarth MA et al, 1990, USA</td>
<td>240 patients over 2 yrs old presenting to the emergency department with a skin laceration 5 cm or less that required suturing</td>
<td>Partially blinded PRCT</td>
<td>Anaesthesia by pain score by patients, parents, suture technicians and research assistant observers</td>
<td>No significant difference between TAC, bupivacaine with NA and lidocaine infiltration. All other agents less effective</td>
<td>The method of randomisation is described as block randomisation but there are 60 patients in both the lidocaine and TAC groups with 30 patients in each of the other groups. It is mentioned in the results area that some patients required supplemental lidocaine infiltration but it does not say who or how this affected the outcomes. Raw data are not provided, only the statistical methods and results of significance</td>
</tr>
<tr>
<td>Kendall JM et al, 1996, UK</td>
<td>107 children between 3 and 16 yrs presenting to the emergency department with wounds less than 4 cm requiring suturing</td>
<td>PRCT</td>
<td>Pain score on application of anaesthetic</td>
<td>Pain score on wound closure No significant difference between lidocaine and TAC. 14.3% of patients found procedure with AC gel “stressful” or “unacceptable” compared with 39% of parents when lidocaine was used</td>
<td>No mention of wound site. No breakdown of different age groups of children</td>
</tr>
<tr>
<td>Ernst AA et al, 1997, USA</td>
<td>66 patients aged 5 yrs or over with lacerations &lt;10 cm</td>
<td>PRCT</td>
<td>Pain of anaesthetic application</td>
<td>LAT gel significantly less painful than lidocaine injection (p&lt;0.001). Mean VAS by physician for LAT = 0 and lidocaine = 1.4. Mean VAS by patient for LAT = 0, lidocaine = 1.2</td>
<td>Small study. Data in figures poorly labelled</td>
</tr>
<tr>
<td>Smith GA et al, 1997, USA</td>
<td>71 patients 2 yrs or over presenting to the emergency department with a laceration on the face or scalp less than 5 cm that required suturing</td>
<td>PRCT</td>
<td>Effective anaesthesia judged by VAS by suture technician and research assistant</td>
<td>No significant difference between TAC, bupivacaine with NA and lidocaine infiltration. Mepivacaine less effective (p = 0.003 and 0.0003, respectively)</td>
<td>Small numbers. Results provided in graph form</td>
</tr>
</tbody>
</table>

AC, adrenaline-cocaine; LAT, lidocaine-adrenalinetrazocaine; NA, nonadrenaline; PRCT, prospective randomised controlled trial; TAC, tetracaine-adrenaline-cocaine solution; VAS, visual analogue scale.
lidocaine infiltration] in [reducing the pain and distress of wound closure].

Clinical scenario
A 7 year old boy presents with a scalp laceration that requires suturing for optimal wound closure. His mother tells you that he is scared of needles and is liable to become upset. You wonder if topical anaesthetic would be as effective as lidocaine infiltration in allowing pain free wound closure.

Search strategy
OVID interface on the World Wide Web: 1966–December 2004; Cochrane database of systematic reviews, edition 4 2004; Medline: [Anesthetics, Local/or Anesthesia, Local/or Lidocaine/or Bupivacaine/or local anaesthetic.mp] OR [Administration, Topical/or Anesthetics, Local/] AND [pediatric filter] LIMIT to human and english language and all child <0 to 18 yrs>; Cochrane: Laceration topical

Search outcome
Medline: 46 papers of which seven were relevant to this question (table 4); Cochrane: 8 papers, none relevant.

Comment(s)
Application of topical anaesthetic for minor skin lacerations is significantly less painful than infiltration of local anaesthetic. The anaesthetic effect produced appears to be similar, particularly for face or scalp wounds. In addition topical anaesthetic will not cause tissue distorsion due to injection. The possibility of improved compliance plus the reduced use of needles will decrease the risk of needle-stick injury. Topical agents that do not include cocaine are cheaper, do not involve the rigmarole of dealing with a controlled drug and may be safer to use in children. All of the studies excluded wounds involving mucous membranes or poorly vascularised areas and extremities. There were no adverse effects in any of the listed papers that could be attributed directly to cocaine use though serious consequences have been documented in published case reports. The use of a topical agent in a gel form rather than a liquid may reduce some of the associated risks.

► CLINICAL BOTTOM LINE
Topical anaesthetics should be used on selected minor lacerations in children as they have similar efficacy to lidocaine infiltration but are less painful to apply. The ideal combination and concentration of agents providing optimal levels of efficacy and safety has yet to be decided.