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

S D Carley, Department of Emergency Medicine, Manchester Royal Infirmary, Oxford Road, Manchester M13 9WL, UK; s.carley1@btinternet.com


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.D.E. 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.
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).

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 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).

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.2 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 most cases within two months of the onset of the facial paralysis and by six months in most cases.1 2 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

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 2x2 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></td>
<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>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>Not planned interventions; patients seemingly assigned to different treatment groups at the initial treating surgeon’s discretion, no randomisation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Functional outcome (excellent, good, or poor)</td>
<td>31 (96.6%) “excellent” in neighbour strapping group v 39 (93%) in splintage group</td>
<td>No statistical analysis</td>
</tr>
</tbody>
</table>


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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>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</td>
<td>Prospective interventional trial</td>
<td>Functional outcome (excellent, good, poor, or fair, assessed by an independent examiner)</td>
<td>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)</td>
<td>Not a controlled trial</td>
<td></td>
</tr>
</tbody>
</table>

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.2 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 most cases within two months of the onset of the facial paralysis and by six months in most cases.1 2 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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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.


**Salinas RA et al., 2001, Chile.** 3 RCTs with a total of 117 patients. One trial compared cortisone acetate with placebo; one compared prednisolone plus vitamins, with vitamins alone, and one, not placebo controlled, tested the effect of methylprednisolone.

**Salman and MacGregor, 2001, Canada.** 8 RCTs in total. 5 trials comparing steroids with no intervention, 1 trial each comparing steroids with either ayaclovir or vitamins, or hyperbaric oxygen.

**Dhiravibulya K, 2002, Thailand.** 75 children with Bell’s palsy, 28 excluded. Of the remaining 47 children in the study received oral prednisolone.

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### Table 3

<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>Unuvar E et al., 1999, Turkey</td>
<td>42 children with complete facial palsy</td>
<td>RCT (level 1b)</td>
<td>Recovery at 4, 6, and 12 months</td>
<td>Recovery rate: group 1, 86% and 100% at 4 and 6 months; and group 2, 72% and 86% at 4 and 6 months. All regained facial nerve function at 12 months</td>
<td>Small numbers</td>
</tr>
<tr>
<td>Salinas RA et al., 2001, Chile</td>
<td>3 with a total of 117 patients. One trial compared cortisone acetate with placebo; one compared prednisolone plus vitamins, with vitamins alone, and one, not placebo controlled, tested the effect of methylprednisolone</td>
<td>Systematic review (level 1a)</td>
<td>Effect of steroids therapy in the recovery of Bell’s palsy</td>
<td>Overall 13/59 (22%) of patients allocated to steroid therapy had incomplete recovery 6 months after randomisation compared with 15/58 (26%) in control group</td>
<td>Only one trial was done exclusively in children (mentioned above), Unuvar et al</td>
</tr>
<tr>
<td>Salman and MacGregor, 2001, Canada</td>
<td>8 RCTs in total. 5 trials comparing steroids with no intervention, 1 trial each comparing steroids with either ayaclovir or vitamins, or hyperbaric oxygen</td>
<td>Systematic review (level 1b)</td>
<td>Clinical and electrical recovery in 6 trials, clinical recovery with electromyography if no recovery in 1 trial, and in the last one 3 doctors assessed photos and complication rate.</td>
<td>3 trials found no significant difference with steroids. 4 trials showed some benefit with steroids whereas 1 trial showed hyperbaric oxygen to be more effective</td>
<td>Only one trial was done exclusively in children (mentioned above), Unuvar et al</td>
</tr>
<tr>
<td>Dhiravibulya K, 2002, Thailand</td>
<td>75 children with Bell’s palsy, 28 excluded. Of the remaining 47 children in the study received oral prednisolone</td>
<td>Retrospective case series January 1996-July 2001 (level 4)</td>
<td>Recovery from Bell’s palsy</td>
<td>Of the 39 who received prednisolone, complete recovery in 24 (61.5%), nearly complete in 15 (38.5%). All children, including those who did not receive steroid, recovered completely within 7 months</td>
<td>Uncontrolled, retrospective, observational study</td>
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</table>

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**REFERENCES**


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**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 lidocaine infiltration]?
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>
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</thead>
<tbody>
<tr>
<td>Pryor GJ et al, 1990, 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 adults</td>
<td>Few baseline data about patient group. Some data presented in graph form or percentage values only with significance mentioned in accompanying text</td>
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<td></td>
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<td>Efficacy of anaesthesia in patients over 10 yrs</td>
<td>In 10-17 yrs old patients TAC was effective in 82% and lidocaine in 83% (p=1). In patients over 17 yrs TAC was effective in 86% and lidocaine in 92% (p=0.25)</td>
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<td></td>
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<td>Time taken to repair wound</td>
<td>Significantly reduced in children under 5 yrs (p=0.005)</td>
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<tr>
<td>Anderson AB et al, 1990, USA</td>
<td>151 children under 18 yrs presenting to the emergency department with skin lacerations less than 5 cm. Intradermal lidocaine versus topical TAC versus topical placebo (adrenaline plus normal saline)</td>
<td>PRCT</td>
<td>Initial anaesthesia (tested by pinprick)</td>
<td>TAC 89%, lidocaine 79%, placebo 17% (TAC v placebo p=0.0001; lidocaine v placebo p&lt;0.0001)</td>
<td>Method of randomisation not clear from text. One error noted in results table. Some data only given in chart form</td>
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<td>Patients requiring additional lidocaine infiltration</td>
<td>TAC 18%, lidocaine 23%, placebo 60% (TAC v placebo p=0.0001; lidocaine v placebo p=0.0005)</td>
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<td>Complete patient compliance—assessed by physician</td>
<td>TAC 80%, lidocaine 49%, placebo 43% (TAC significantly better than either lidocaine or placebo p=0.002)</td>
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<tr>
<td>Hegenbarth MA et al, 1990, USA</td>
<td>467 patients aged 18 yrs or younger presenting to an emergency department with minor lacerations requiring suturing. Wounds classified as head/scalp or trunk/extremity then randomised to either topical TAC or lidocaine infiltration</td>
<td>PRCT</td>
<td>Adequacy of anaesthesia for scalp/head wounds</td>
<td>TAC adequate in 80.7%, lidocaine adequate in 86.6% (p=0.159)</td>
<td>Randomised by case note number. Error in p value for adequacy of anaesthesia for scalp/head wounds. Only 68% of patients followed up when looking at wound infection rates though dropout rate similar in each group (68% of TAC patients, 68% of lidocaine patients reviewed)</td>
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<td>Adequacy of anaesthesia for extremity/trunk wounds</td>
<td>TAC adequate in 84.3%, lidocaine adequate in 89.4% (p&lt;0.0001) 2.2% for both TAC and lidocaine groups</td>
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<tr>
<td>Smith GA, et al, 1996, 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>
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<td></td>
<td>Pain score on application of anaesthetic</td>
<td>Infiltration of lidocaine significantly more painful than application of TAC (p=0.001)</td>
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<td></td>
<td></td>
<td></td>
<td>Pain score on wound closure</td>
<td>No significant difference between lidocaine and TAC</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Acceptability of procedure</td>
<td>14.5% of parents found procedure with AC gel &quot;stressful&quot; or &quot;unacceptable&quot; compared with 39% of parents when lidocaine was used</td>
<td></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>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></td>
<td></td>
<td></td>
<td>Pain score on wound closure</td>
<td>No significant difference between lidocaine and TAC</td>
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</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>
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<td>Small numbers. Results provided in graph form</td>
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<tr>
<td></td>
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<td></td>
<td>Pain of suturing</td>
<td>No significant difference between lidocaine and LAT gel. (Physician p=0.83, patient p=0.68)</td>
<td></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. Topical TAC versus topical mepivacaine and NA v lidocaine infiltration</td>
<td>PRCT</td>
<td>Effective anaesthesia judged by VAS by suture technician and research assistant</td>
<td>No significant difference between effect of TAC and lidocaine infiltration Mepivacaine less effective (p=0.003 and 0.0001, respectively)</td>
<td></td>
</tr>
</tbody>
</table>

AC, adrenaline-cocaine; LAT, lidocaine-adrenaline-tetracaine; NA, noradrenaline; 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 [paediatric 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.


Transthoracic ultrasonography to diagnose pneumothorax in trauma

Usman Jaffer and Duncan McAuley

doi: 10.1136/emj.2005.026542

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