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

Edited by K Mackway-Jones

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 practicing clinicians. The search strategies used to find the best evidence are reported in detail in order to allow clinicians to update searches whenever necessary. The BETs published below were first reported at the Critical Appraisal Journal Club at the Manchester Royal Infirmary1 or placed on the BestBETs web site. Each BET has been constructed in the four stages that have been described elsewhere.2 The BETs shown here together with those published previously and those currently under construction can be seen at http://www.bestbets.org.3 Six BETs are included in this issue of the journal.

▶ Seldinger technique chest drains and complication rate
▶ Antacids and diagnosis in patients with atypical chest pain
▶ Need for cervical spine imaging for alert children after trauma
▶ Cervical spine imaging in children under 9 after trauma
▶ Conservative management of asymptomatic cocaine body packers
▶ Acute myocardial infarction in cocaine induced chest pain presenting as an emergency

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Seldinger technique chest drains and complication rate

Report by Jon Argall, Senior Clinical Fellow in Emergency Medicine

Checked by Joel Desmond, RCS Research Fellow

Abstract

A short cut review was carried out to establish whether the seldinger “over the wire” technique is better than other techniques of pneumothorax drainage. Altogether 28 papers were found using the reported search, of which three presented 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 30 year old man presents to the emergency department after a road traffic accident. On initial assessment you identify a haemothorax/pneumothorax on the left side of his chest; there are no signs of tension. You elect to place a chest drain and discover that you have a seldinger “over the wire” technique chest drain in front of you. You wonder whether this method of placement is better than any other at achieving successful management of the injury without complication.

Three part question

In [a patient requiring a chest drain after trauma] is [a seldinger “over the wire” technique better than other methods or chest drain placement] at [achieving pneumothorax resolution without complication]?

Search strategy

Medline 1966–12/02 using the OVID interface. [(exp chest tubes OR exp thoracostomy OR “chest drain$”.mp) AND (“seldinger”.mp OR “needle wire dilator”.mp OR “over wire”.mp OR “small bore”.mp OR pigtail.mp OR “pig tail”.mp)] LIMIT to human AND English.

Search outcome

Altogether 28 papers were found by the Medline search. No papers were directly relevant but three papers had some relevance to our clinical question. These are listed in table 1.

Comment(s)

There is no comparative work looking at the use of a seldinger technique for placement of chest drains in adult trauma patients. Of the papers that were found uncontrolled series reports document their comparatively safe use in adults and children in well controlled elective and intensive care settings. Complications such as recurrence of the pneumothorax, kinking of the drain do still occur as is seen in the open technique, but insertion complications or difficulties seem to be rare.

▶ CLINICAL BOTTOM LINE

There is no evidence to show that a seldinger over the wire insertion technique is superior to traditional methods.


Antacids and diagnosis in patients with atypical chest pain

Report by Stewart Teece, Clinical Research Fellow
Checked by Ian Crawford, Clinical Research Fellow

Abstract
A short cut review was carried out to establish whether antacids can be used as a diagnostic test in atypical chest pain. Altogether 374 papers were found using the reported search, of which two presented 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 57 year old man presents with a one hour history of central chest pain the character of which he cannot describe. There is no radiation but there is mild sweating and subjective shortness of breath. He has a history of smoking, hypertension, angina, and a hiatus hernia; the pain came on after a curry. He has a normal ECG on admission and an unremarkable examination. You cannot decide whether this is cardiac or gastro-oesophageal in origin and wonder whether a single dose of antacid might relieve his pain and therefore clarify the diagnosis.

Three part question
In [a patient with chest pain of uncertain aetiology] is [the use of antacids/alginites] useful for [differentiating between cardiac and gastro-oesophageal causes]? 

Search strategy
Medline 1966–12/02 using the OVID interface. [exp chest pain OR exp angina pectoris OR exp angina, unstable OR exp coronary disease OR exp myocardial infarction OR chest pain.af OR angina.af OR coronary.af OR myocardial.af OR cardiac.af OR myocardis$.af] AND [exp alginates OR exp antacids OR algicin$.af OR antacid.af OR antacids.af OR gaviscon.af OR algicron.af OR gastrocote.af OR peptac.af OR topal.af OR indigestion.af OR heartburn.af OR dyspepsia.af] LIMIT to human AND English language.

Search outcome
Altogether 374 papers were found only two of which directly addressed the three part question (table 2).

Comment(s)
Both studies are small, however in the Henderson paper if the 95% confidence intervals are calculated (81.5% to 100% typical, 9% to 30.2% atypical) there is a distinct difference between the two groups despite all the patients having normal ETTs and angiography. A further paper by Davies et al has shown that the instillation of acid into the stomach decreases the angina threshold on exercise testing. The above tests would suggest that reflux affects angina and vice versa. The vagus nerve has been suggested as the common link between the two.

> CLINICAL BOTTOM LINE
Antacids are useful in the relief of pain that is clearly oesophageal in origin but the effect is insufficiently specific to be of value in aiding diagnosis.


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>Ahmed MY et al, 1995, USA</td>
<td>24 children aged 4 months to 24 years from a single paediatric ICU</td>
<td>Retrospective single centre case series</td>
<td>Time for insertion</td>
<td>4 to 7 minutes</td>
<td>No control group</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Complications</td>
<td>5 tubes became kinked, causing 4 pneumothoraces to recur. 2 drains had to be reinserted. Otherwise no major complications</td>
<td>Retrospective</td>
</tr>
<tr>
<td>Patz ER Jr et al, 1998, USA</td>
<td>106 patients having elective insertion of a small-bore catheter for sclerotherapy for malignant pleural effusion</td>
<td>Prospective case series</td>
<td>Success of insertion</td>
<td>No insertion failures reported</td>
<td>Different scenario to the emergency department</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Infections</td>
<td>No infections reported</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other complications</td>
<td>Pain scores for insertion not done but stated that technique was well tolerated</td>
<td>Sub-study of a sclerotherapy trial</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not directly relevant to our clinical question</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Outcome measures were not defined before study</td>
<td></td>
</tr>
<tr>
<td>Roberts JS et al, 1998, USA</td>
<td>133 chest catheters inserted into 91 children in ICU. Age range 0–18 years. Weight 1.8–66 kg</td>
<td>Retrospective case series</td>
<td>Pneumothorax resolution</td>
<td>15 of 20 patients who had drain for pneumothorax had complete resolution (75%)</td>
<td>Not directly relevant to the emergency department</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Complications</td>
<td>80% had congenital heart disease</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>67% intubated</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not directly relevant to the methodology</td>
<td>Retrospective uncontrolled methodological</td>
</tr>
</tbody>
</table>

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Need for cervical spine imaging for alert children after trauma

Report by Andreas Kontos, Savvas Omorphos, Medical students

Checked by Joel Desmond, RCS Research Fellow

Abstract

A short cut review was carried out to establish whether clinical examination can be used to exclude cervical spine injury in alert children. Altogether 298 papers were found using the reported search, of which three presented 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

An 11 year old boy is brought to the emergency department by paramedics after falling off his bicycle. They have immobilised his cervical spine with a hard collar. He has no visible external injury, is fully alert and cooperative and does not complain of any neck pain. You are aware of the “trend” for radiographic cervical spine imaging in virtually all blunt trauma patients, as recognised cervical spine injury can lead to disastrous neurological sequelae. However, you wonder whether imaging in this case is really necessary.

Three part question

In [alert children with suspected cervical trauma] is [clinical examination without cervical radiography] adequate to [exclude significant cervical injury]?

Search strategy

Medline 1966–12/02 using the OVID interface. [(exp spinal cord injuries) OR (cervical spine injuries.mp)] AND [(exp x-rays) OR (x-rays.mp) OR (radiograph$.mp)] AND [Best-BETS Paediatric filter] LIMIT to human AND English.

Search outcome

Altogether 298 papers were identified of which two were relevant. In addition NICE are undergoing a systematic review of head and cervical spine injury, and checking their search results, we found one additional paper that has not yet been indexed by Medline. These three papers are shown in table 3.

Comment(s)

Although the issue of radiographic assessment of children with suspected cervical injury has been addressed in several studies, there is still insufficient evidence to support diagnostic standards, as the incidence of cervical injuries among pediatric samples is low. To date, the Nexus criteria (absence of: (1) midline cervical tenderness, (2) altered alertness, (3) intoxication, (4) neurological deficit, and (5) painful distracting injury) provide the most reliable instrument for assessing the need for cervical spine radiography in paediatric blunt trauma victims. However, in doubtful individual cases, decision should be at the clinician’s discretion, as these criteria may not be 100% sensitive, because of the wide confidence interval around these findings.

> CLINICAL BOTTOM LINE

Cervical spine radiography is not necessary in paediatric blunt trauma victims over the age of 9 who are fully alert, conversant, show no signs of intoxication, have no neurological deficit, no midline cervical tenderness, and no painful distracting injury.


Cervical spine imaging in children under 9 after trauma

Report by Savvas Omorphos, Andreas Kontos, Medical students

Checked by Joel Desmond, RCS Research Fellow

Abstract

A short cut review was carried out to establish whether the odontoid peg view is useful to radiologically exclude cervical spine injury in children under 9 years of age. Altogether 156 papers were found using the reported search, of which two presented the best evidence to answer the clinical question. In addition recent guidelines are noted. 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

You have just read a recent important publication by the American Association of Neurological Surgeons and the Congress of Neurological Surgeons who recommend that in the under 9 age group, children requiring radiological assessment of their cervical spine need only undergo an AP or lateral cervical spine view. It is your current practice to perform three...
view radiography but you realise that getting the odontoid peg view can be very difficult in non-compliant children. You wonder on what evidence this specific guideline was based.

**Three part question**

In [children under 9 years old with suspected cervical spine injury] is [the odontoid peg view needed in addition to lateral and antero-posterior views] to [radiologically clear the cervical spine]?

**Search strategy**

Medline 1966–12/02 using the OVID interface. [(exp Spinal Cord Injuries) OR (spinal cord injury$) OR (cervical spine injury$) OR (spinal fracture$) OR (exp x-rays) OR (x-rays) OR (radiographs$)] AND [(exp odontoid process) OR (odontoid.mp)] AND [BestBETs Paediatric filter] LIMIT to Human AND English.

**Search outcome**

Altogether 156 papers were identified of which two were relevant. The reference list of the guidelines were also searched but these were the only two papers of direct relevance. The two papers and the guidelines are summarised in table 4.

**Comment(s)**

The comprehensive review of the literature by the American Association of Neurological surgeons in 2002 come to the conclusion that odontoid peg views in the under 9 age group are unnecessary. However, Swischuk et al in their survey of 432 paediatric radiologists report that they have identified 46 fractures, seen on the odontoid peg view that could not be seen on the lateral view. The American Association have set the current best evidence guidelines in this area but it should be remembered that they warn that these do not represent diagnostic standards and caution should be used in their application.

### CLINICAL BOTTOM LINE

Guidelines on cessation of the odontoid peg views in the under 9 age group should be viewed with great caution.


### Conservative management of asymptomatic cocaine body packers

**Report by Debasis Das, House Officer in Surgery**

**Checked by Baha Ali, Senior Clinical Fellow in Emergency Medicine**

**Abstract**

A short cut review was carried out to establish whether asymptomatic cocaine body packers can be managed conservatively. Altogether 171 papers were found using the reported search, of which four presented the best evidence to answer the clinical question. The author, date and country of publication, patient group studied, study type, relevant

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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>Laham JL et al, 1994, USA</td>
<td>268 children aged 0–19, with apparent isolated head injuries defined by clinical and radiographic evidence in a single children’s hospital. Low risk criteria for c-spine injury: capable of verbal communication and no neck pain</td>
<td>Retrospective cohort study</td>
<td>Performance of low risk criteria for excluding c-spine injury</td>
<td>No cervical spine injuries in the low risk group (n=135), 10 (7.5%) cervical injuries in the high risk group. (n=133), Sensitivity 100%, Specificity 52%</td>
<td>The entry criteria: significant head injury needing admission was made at the discretion of the PICU triage officer. GCS was not consistently recorded in these children. 215 children had cervical radiographs (80%)</td>
</tr>
<tr>
<td>Viccellio P, et al, 2001, USA</td>
<td>Multicenter evaluation of 3065 children (age &lt;18) with suspected c-spine injury who underwent clinical evaluation before c-spine radiography. Low risk criteria (Nexus criteria) were defined as absence of: (1) midline cervical tenderness, (2) painful distracting injury, (3) altered alertness, (4) neurological deficit, and (5) intoxication</td>
<td>Prospective cohort study</td>
<td>Performance of low risk criteria for excluding c-spine injury</td>
<td>No child in the low risk group of 603 patients had a c-spine injury. Nexus criteria identified all cases of cervical injury diagnosed by radiography, Sensitivity 100% (CI 87.8% to 100%), Specificity 19.8%</td>
<td>Number of children with cervical spine injury under nine was very low (only 4). Total number of children with cervical injury was only 30 (0.98%), therefore, CI for sensitivity was wide (87.8% to 100%). Caution is suggested for applying the Nexus criteria for children under 9 years.</td>
</tr>
<tr>
<td>American Association of Neurological Surgeons and the Congress of Neurological Surgeons, 2002, USA</td>
<td>Search of Medline (1966–2001) in the following subject headings: “spinal injuries” and “child” were reviewed with “cervical vertebrae”, “spinal injuries” and “child”. Altogether, 58 relevant articles were identified</td>
<td>Systematic review</td>
<td>Guidelines for the management of acute cervical spine and spinal cord injuries</td>
<td>In children experiencing trauma who are alert, conversant, have no neurological deficit, no midline cervical tenderness, no painful distracting injury and not intoxicated, cervical spine radiographs not recommended. This is a recommendation from grade 3 evidence papers except Nexus paper, which is grade 2</td>
<td>Search strategy is not reproducible. No mention of searching the grey literature or contacting experts for papers.</td>
</tr>
</tbody>
</table>
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>Swischuck L et al, 2000, USA</td>
<td>984 questionnaires submitted to paediatric radiologists (432 respondents) to determine whether odontoid views were included in the imaging protocols and how often odontoid fractures were missed on lateral views and detected on odontoid views in children under 5 years</td>
<td>Survey</td>
<td>Concept that the odontoid view might not be necessary in children under 5</td>
<td>Of the 432 respondents, 161 (37%) indicated that an open mouth odontoid view was not routinely included in their imaging protocol. Of the 271 respondents who routinely use the open mouth odontoid view, 122 (45%) would request a CT if this view was too difficult to obtain. 28 of the 432 respondents (7%) reported missing a total of 46 fractures on the lateral view that were detected on the odontoid view.</td>
<td>Only 44% of radiologists responded. Recollection of a missed fracture is not a reliable method of data collection. Emergency physicians, not radiologists are the cohort of doctors who are actually most likely to recall missed fractures such as these.</td>
</tr>
<tr>
<td>Buhs C et al, 2000, USA</td>
<td>Multi-institutional review of all paediatric patients in the 0–16 age group with a documented cervical spine injury during a 10 year period from 1987–1997 at 4 hospitals. 51 children with cervical spine injury were identified from the medical records</td>
<td>Retrospective cohort study</td>
<td>Identification of a cervical fracture on odontoid peg view alone.</td>
<td>In no child in the 0–8 year old group was the odontoid peg view useful to make a diagnosis of fracture. Also in 63% of these children, the film was of such poor quality that the dens could not be evaluated. In the 9–16 year-old group only 1 of 36 children (3%) was the open mouth view the diagnostic view (a Type III odontoid injury).</td>
<td>Total number of children with cervical injury was only 51. This study looks retrospectively at positive fractures only, no cohort of odontoid views was analysed, thus limiting greatly the utility of this study.</td>
</tr>
<tr>
<td>American Association of Neurological Surgeons and the Congress of Neurological Surgeons, 2002, USA</td>
<td>Search of Medline (1966–2001), systematic review in the following subject headings: “spinal injuries” and “child” were reviewed with “cervical vertebrae”, “spinal injuries” and “child”. Altogether, 58 relevant articles were identified</td>
<td>Guidelines for the management of acute cervical spine and spinal cord injuries</td>
<td>Insufficient evidence to support diagnostic standards however the following are recommended. In children &lt;9 years of age who have experienced trauma and are non-concussive, or have neurological deficit, an altered mental status, neck pain, or a painful distracting injury, are intoxicated, or have unexplained hypotension it is recommended that anteroposterior and lateral cervical spine radiographs be obtained.</td>
<td>Search strategy is not fully described in this paper. Note authors came to their recommendations largely on the two other studies summarised above.</td>
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</tbody>
</table>

outcomes, results and study weaknesses of these best papers are tabulated. A clinical bottom line is stated.

Clinical scenario
You are called to see a young adult male who is accompanied by two members of Her Majesty’s Customs and Excise. They tell you that he is under suspicion of trying to smuggle drugs into the country and that he may have done this by ingesting packets of cocaine. Physical examination is unremarkable, but abdominal radiography does reveal multiple, oval foreign bodies in the bowel. You know that such “body packers” might well develop intestinal obstruction and/or get potentially fatal cocaine toxicity from leakage of the contents of these packages in their bowels. You wonder whether to simply leave the patient as he is and observe him for signs of obstruction and/or pending cocaine toxicity, intervene conservatively and do the latter as well, or do something more aggressive to remove the packages from the patient’s intestines.

Three part question
In [asymptomatic patients who have swallowed packets of cocaine in order to smuggle them across borders] is [conservative management] effective at [preventing the morbidity and mortality associated with body packing]?

Search strategy

Search outcome
Altogether 171 papers found of which 111 were irrelevant and a further 57 papers were unsuitable for inclusion due to either having insufficient patient numbers to be useful (usually single/double case reports—range: 1–7 patients, n=36 papers, including five letters/editorials), or for being irrelevant to the other core issue of how to actually manage cocaine packet ingestion (n=19 papers—usually on only investigating body packing). In addition one more relevant paper, not yet indexed on Medline was found. The four papers are shown in table 5.

Comment(s)
It has generally become accepted that cocaine body packers who show signs of cocaine toxicity or gastrointestinal obstruction need emergency surgery. Additionally, when packets show signs of in vivo degradation (passing pieces of sloughed packet wrappings or actual packets with deteriorated packaging) emergency surgery may also be warranted. The general management plan in asymptomatic cocaine body packers would seem to be conservative management consisting of mild laxatives and light solid or clear liquid diet with close monitoring and intravenous access maintenance throughout. Treatment usually ceases with the passage of at

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least two packet free stools, with or without supporting radiographic data (abdominal radiograph/KUB), and only McCarron and Wood suggest using suppositories to obtain non-obstructing, intra-rectal packets.

That said, details such as management environment (intensive care/high dependency unit, emergency department, or general ward?) still remain unclear, and because none of the series mentioned above are prospective, randomised control trials, the validity of their results can also be called into question.

► CLINICAL BOTTOM LINE

The best evidence available suggests that asymptomatic cocaine body packers can be managed conservatively until they have completely passed their packets. Close clinical observation in the meantime allows for the early detection of patients developing complications that may require emergency surgery.


Acute myocardial infarction in cocaine induced chest pain presenting as an emergency

Report by Simon Carley, Specialist Registrar
Checked by Baha Ali, Senior Clinical Fellow

Abstract

A short cut review was carried out to establish the incidence of acute myocardial infarction in patients presenting as emergen-
a higher false positive rate in these patients. A normal ECG reduces but does not exclude myocardial damage. Most acute myocardial infarction patients will present with ST elevation or an abnormal ECG. Many of the above papers exhibit selection bias as only admitted patients are used, this may account for some of the higher incidences recorded. They also enrol patients who have taken cocaine hours before symptomatology, this contradicts the known pharmacology of cocaine. Early presentation after cocaine use would normally be expected. It must be remembered that some of the reported incidence will be coincidental. Those patients presenting with normal findings, and a normal ECG have a low but not absent acute myocardial infarction risk. They should have myocardial damage excluded.

**Clinical Bottom Line**

Acute myocardial infarction should be excluded using cardiac markers in patients presenting to the emergency department with cocaine related chest pain.

### Table 6

<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>Kossowsky WA et al, 1989, USA</td>
<td>19 patients presenting with chest pain shortly after intranasal, iv or smoking of cocaine</td>
<td>Prospective cohort study</td>
<td>Incidence of AMI</td>
<td>17 (89%) that demonstrate non-Q wave infarction, 2 with Q wave infarction, 5 patients: 4 normal coronary arteries, 1 proximal stenosis of right coronary artery</td>
<td>Small study, Hospitalised patients only</td>
</tr>
<tr>
<td>Amin M et al, 1990, USA</td>
<td>70 patients with cocaine associated chest pain</td>
<td>Retrospective cohort study</td>
<td>Incidence of AMI</td>
<td>22/70 (31%)</td>
<td>Small study, Hospitalised patients only</td>
</tr>
<tr>
<td>Zimmerman JL et al, 1991, USA</td>
<td>48 admitted patients with cocaine associated chest pain</td>
<td>Retrospective case note review</td>
<td>Incidence of AMI</td>
<td>3/48 (6%)</td>
<td>Wide distribution of time between use and presentation, Not ED patients</td>
</tr>
<tr>
<td>Feldman JA et al, 2000, USA</td>
<td>293 patients with cocaine associated chest pain. Substudy of the Ac-TIPI trial</td>
<td>Prospective cohort study</td>
<td>Incidence of AMI</td>
<td>(0.7%) CI 0.08% to 2.4% with cocaine</td>
<td>Sub study of another trial</td>
</tr>
</tbody>
</table>


