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 Infirmary or placed on the BestBETs web site. Each BET has been constructed in the four stages that have been described elsewhere. The BETs shown here together with those published previously and those currently under construction can be seen at http://www.bestbets.org. 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

K Mackway-Jones
Department of Emergency Medicine, Manchester Royal Infirmary, Oxford Road, Manchester M13 9WL, UK, kevin.mackway-jones@man.ac.uk


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 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/alginate] useful for [differentiating between cardiac and gastro-oesophageal causes]?

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>Complications (5 tubes became kinked, causing 4 pneumothoraces to recur. 2 drains had to be reinserted. Otherwise no major complications)</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. 14 F small bore catheter was inserted by Seldinger technique, with image guidance</td>
<td>Prospective case series</td>
<td>Success of insertion</td>
<td>No insertions failures reported</td>
<td>No infections reported</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. 7 to 8.5 F percutaneous pigtail catheters inserted in conjunction with wire and dilator by Seldinger technique</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>Complications (Haemothorax 2%, Pneumothorax 2%, Emphysema 1%, Cannulation of hepatic vein 1 pt, Failure to drain pneumothorax 11%, Dislocation 5%, 1/3rd of complications were in infants &lt;5 kg)</td>
</tr>
</tbody>
</table>

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 myocardial$af$] AND [exp alginates OR exp antacids OR alginate OR antacid OR algic OR gaviscon.af OR algic OR gastrocote.af OR peptic.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 ETT's 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.


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 unrecognised 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 injury$) AND ((exp x-rays) OR (x-rays.mp) OR (radiograph$.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 paediatric 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
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)</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>
</tbody>
</table>

American Association of Neurological Surgeons and the Congress of Neurological Surgeons, 2002, USA | 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 | Systematic review | Guidelines for the management of acute cervical spine and spinal cord injuries | 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 | Search strategy is not reproducible. No mention of searching the grey literature or contacting experts for papers. |

Best evidence topic reports

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

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 cerebral 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 injurs.mp) OR (cervical spine injur$.mp) OR (spinal fractur$.mp) OR (exp x-rays) OR (x-rays.mp) OR (radiographs$.mp)] 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 relevence. 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.
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.</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-conversant, or have neurological deficit, an altered mental status, neck pain, or a painful distracting injury, are intubated, 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>
<td></td>
</tr>
</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
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.


## Table 5

<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>McCarron MM and Wood JD, 1983, USA</td>
<td>48 suspected smugglers with ingested intra-corporeal cocaine packets (number of packets per patient: 12–178)</td>
<td>Prospective cohort</td>
<td>Complete passage of packets per rectum</td>
<td>47 patients</td>
<td>1 patient with obstruction 2 patients developed cocaine toxicity due to packet</td>
</tr>
<tr>
<td>Caruana DS et al, 1984, USA</td>
<td>50 patients with ingested intra-corporeal cocaine packets (number of packets passed per patient: 54–182)</td>
<td>Retrospective cohort</td>
<td>Complete passage of packets per rectum using conservative management</td>
<td>44 patients</td>
<td>Treatment environment unknown</td>
</tr>
<tr>
<td>Aldighetti L et al, 1996, Italy</td>
<td>61 asymptomatic suspected smugglers with ingested intra-corporeal packets of cocaine (number of packets ingested per patient: 52–117)</td>
<td>Retrospective cohort</td>
<td>Complete passage of packets per rectum using conservative management</td>
<td>61 patients</td>
<td>Treatment environment unknown</td>
</tr>
<tr>
<td>Bulstrode N et al, 2002, UK</td>
<td>180 suspected smugglers with ingested intra-corporeal packets of contraband. (number of packets per patient: 2–217)</td>
<td>Retrospective cohort</td>
<td>Complete passage of packets per rectum using conservative management</td>
<td>144 asymptomatic body packers</td>
<td>Several key details unknown, for example, exact management of the 144 packers who were not admitted and discharge criteria</td>
</tr>
</tbody>
</table>

### 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 emergency cases with post-cocaine chest pain. Altogether 198 papers were found using the reported search, of which eight 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 32 year old man presents to the emergency department with central chest pain suggestive of cardiac ischaemia. He has had pain for 50 minutes after nasal cocaine. He is an occasional cocaine user who has not had chest pain previously. He is previously well. His 12 lead ECG is normal and he is now pain free. You see him in the resuscitation room and prescribe oral aspirin 300 mg. He is cardiovascularly stable. You admit him and do a 12 hour troponin T, which is normal. The next day a colleague suggests that there was no need to admit as he was well, had a normal ECG, had few risk factors, and that as cocaine causes spasm rather than clots he could have gone home. You wonder whether this is good advice.

**Three part question**

In [patients presenting with cocaine associated chest pain] what [is the incidence] of [acute myocardial infarction]?

**Search strategy**


**Search outcome**

No relevant papers found on Cochrane library. Altogether 198 papers were found on Medline of which eight were relevant to the three part question (see table 6).

**Comment(s)**

The incidence of acute myocardial infarction in cocaine associated chest pain is small but significant. The ECG seems to have
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 smoking of cocaine</td>
<td>Prospective cohort study</td>
<td>Incidence of AMI</td>
<td>17 (89%) that demonstrate non-Q wave infarction</td>
<td>Small study</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 with Q wave infarction</td>
<td>Hospitalised patients only</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 patients</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 normal coronary arteries</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 proximal stenosis of right coronary artery</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coronary angiogram</td>
<td></td>
<td></td>
<td></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, Sensitivity of ECG, Specificity of ECG</td>
<td>22/70 (31%)</td>
<td>Small study</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>91%</td>
<td>Hospitalised patients only</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>60%</td>
<td></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, Number of patients with ECG criteria for thrombolysis</td>
<td>3/48 (6%)</td>
<td>Wide distribution of time between use and presentation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>18/48 (37%)</td>
<td>Not ED patients</td>
</tr>
<tr>
<td>Gitter MJ et al, 1991, USA</td>
<td>101 admitted patients with cocaine associated chest pain</td>
<td>Prospective cohort study</td>
<td>Incidence of AMI, Number of patients with ECG criteria for thrombolysis</td>
<td>No patients had AMI confirmed</td>
<td>Poor gold standard used. CK rises or CKMB fractions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8 (8%)</td>
<td></td>
</tr>
<tr>
<td>Holland JE et al, 1994, USA</td>
<td>246 patients presenting with cocaine associated chest pain in 6 US centres</td>
<td>Prospective cohort study</td>
<td>Incidence of AMI, Sensitivity of ECG for AMI, PPV of ECG for AMI</td>
<td>14/246 (6%)</td>
<td>Gold standard was a twofold rise in CKMB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>36%</td>
<td>Not consecutive enrolment of patients</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>90%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>96%</td>
<td></td>
</tr>
<tr>
<td>Mittelman MA et al, 1999, USA</td>
<td>Interviewed 3946 patients with AMI (an average of 4 days after infarction onset)</td>
<td>Case cross over study</td>
<td>38 (1%) reported cocaine use in the previous year, 9 reported cocaine use within the 60 minutes preceding the onset of infarction</td>
<td>The users of cocaine sustained a transient 24-fold increase in risk of MI in the hour immediately after cocaine use and that the increased risk rapidly decreased thereafter</td>
<td>Data based on patient self retained. CI increased risk rapidly decreased thereafter</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Small number of exposed cases</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weber JE et al, 2000, USA</td>
<td>250 patients presenting with cocaine associated chest pain in 29 US centres AMI diagnosed on WHO criteria</td>
<td>Prospective cohort study</td>
<td>Incidence of AMI, Number with ECG changes compatible with ischaemia, Number with ECG changes compatible with infarction, Number without ECG changes who had confirmed infarction</td>
<td>15/250 (6%)</td>
<td>Wide distribution of time between use and presentation (up to 7 days)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>39/250 of which 4 had confirmed AMI</td>
<td>6% had no urinary metabolites</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9/250 of which all had confirmed AMI</td>
<td>Gold standard was a twofold rise in CKMB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2/67 had confirmed AMI</td>
<td>Most (91%) patients used crack cocaine</td>
</tr>
<tr>
<td>Feldman JA et al, 2000, USA</td>
<td>293 patients with cocaine associated chest pain. Sub-study of the Ac-TIPI trial</td>
<td>Prospective cohort study</td>
<td>Incidence of AMI, Incidence of ACS</td>
<td>(0.7%) CI 0.08% to 2.4% with cocaine</td>
<td>Sub study of another trial.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.4% CI 0.37% to 3.5%</td>
<td>WHO criteria for AMI</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Wide variation of AMI incidence between hospitals</td>
</tr>
</tbody>
</table>

---


