BEST EVIDENCE TOPIC REPORTS

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 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. The BETs published below were first reported at the Critical Appraisal Journal Club at the Manchester Royal Infirmary[1] 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.

- ► Oxygen therapy in acute stroke
- ► CT pulmonary angiogram compared with ventilation-perfusion scan for the diagnosis of pulmonary embolism in patients with cardiorespiratory disease
- ► Combining clinical probability and ventilation-perfusion scan for diagnosis of pulmonary embolism
- ► Serum amylase and acute pancreatitis
- ► Ultrasonic guidance and the complications of central line placement in the emergency department
- ► The utility of the tongue blade test for the diagnosis of mandibular fracture

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1 **Carley SD,** Mackway-Jones K, Jones A, *et al.* Moving towards evidence based emergency medicine: use of a structured critical appraisal journal club. *J Accid Emerg Med* 1998;**15**:220–2.
2 **Mackway-Jones K,** Carley SD, Morton RJ, *et al.* The best evidence topic report: a modified CAT for summarising the available evidence in emergency medicine. *J Accid Emerg Med* 1998;**15**:222–6.
3 **Mackway-Jones K,** Carley SD. bestbets.org: Odds on favourite for evidence in emergency medicine reaches the worldwide web. *J Accid Emerg Med* 2000;**17**:235–6.

Oxygen therapy in acute stroke

Report by Katherine Potier de la Morandiere, *Specialist Registrar*
Checked by Darren Walter, *Consultant*

Abstract

A short cut review was carried out to establish whether supplemental oxygen reduces long term disability and mortality in patients attending the emergency department with stroke who do not require resuscitation. Altogether18 papers were found using the reported search, of which one 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 this best paper are tabulated. A clinical bottom line is stated.

Clinical scenario

A 73 year old woman presents to the emergency department with a six hour history of left sided hemiparesis. She has a past history of hypertension. On examination she is GCS 15 with a dense left hemiparesis and her basic observations are stable. You wonder whether the use of supplemental oxygen in the acute stage is needed and will have any effect on long term prognosis.

Three part question

In a [patient presenting to the emergency department with a stroke who does not need resuscitative measures] is [supplemental oxygen better than no oxygen] at [reducing long term disability and mortality]?

Search strategy

Medline 1966-07/03 using the OVID interface. [exp cerebro-vascular accident OR cerebrovacsular.mp OR stroke.mp] AND [exp oxygen OR exp oxygen inhalation therapy OR oxygen.mp] AND [exp disability evaluation OR disability.mp] LIMIT to human AND English.

Search outcome

Altogether 18 papers were found of which one directly addressed the three part question (table 1).

Comment(s)

This large, well conducted study shows no statistically significant difference between the two groups. It shows there is no benefit to giving oxygen routinely to stroke patients, and suggests if given to non-hypoxic patients with mild to moderate strokes may infact increase mortality. The results for severe stroke patients were inconclusive.

The authors hypothesise (based on a small number of animal studies) that this may be attributable to oxygen free radicals.

► CLINICAL BOTTOM LINE

In non-hypoxic patients with minor or moderate strokes supplemental oxygen is of no clinical benefit.

Ronning OM, Guldvog B. Should stroke victims routinely receive supplemental oxygen? A quasi-randomized controlled trial. *Stroke* 1999;**30**:2033–7.

CT pulmonary angiogram compared with ventilation-perfusion scan for the diagnosis of pulmonary embolism in patients with cardiorespiratory disease

Table 1

Author, date and country	Patient group	Study type (level of evidence)	Key results	Outcomes	Study weaknesses
Ronning OM and Guldvog B, 1999, Norway	550 patients presenting within 24 hours after stroke onset	RCT (randomised on birth dates)	Disability at seven months (Barthel Index)	No difference between the two groups on disability (p=0.07) or impairment scores (p=0.67)	Quasi-randomised
	Exclusion criteria: age<60, onset>24 hours, subdural, subarachnoid, TIA Supplemental oxygen v no oxygen		Impairment at seven months (Scandinavian Stroke Scale) Survival at one year	No statistical significant difference (p=0.3) in survival rates One year survival greater in control group (72.9% v 68.8%)	Effects of being treated in a stroke unit

Report by Jonathan Costello, *Specialist Registrar*
Checked by Kerstin Hogg, *Clinical Research Fellow*

Abstract

A short cut review was carried out to establish whether VQ scanning has better utility than CT in investigating possible pulmonary embolus in patients with chronic respiratory disease. A total of 239 papers were found using the reported search, of which one 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 this best paper are tabulated. A clinical bottom line is stated.

Clinical scenario

A 70 year old known COPD patient presents to your emergency department with pleuritic chest pain and dyspnoea suggestive of pulmonary embolus. Initial investigations do not exclude pulmonary embolus. As part of your diagnostic strategy, you wonder if V-Q scintigraphy has better diagnostic utility than CT for pulmonary embolus.

Three part question

In [patients with chronic respiratory disease] does [V-Q scintigraphy have greater diagnostic utility than computed tomography] in the [investigation of pulmonary embolus]?

Search strategy

Medline 1966-07/03 using the OVID interface. (exp Tomography, Spiral Computed OR exp Tomography, X-Ray Computed OR ''CT''.mp) AND (exp Ventilation-Perfusion Ratio OR ''VQ''.mp OR ''V-Q''.mp OR Ventilation Perfusion.mp OR Ventilation-Perfusion.mp OR perfusion.mp) AND (exp pulmonary embolism OR pulmonary embol$.mp OR ''PE''.mp OR Pulmonary infarct$.mp OR exp thromboembolism$ OR thromboembolism$.mp) LIMIT to human AND English.

Search outcome

Altogether 239 were papers found of which 238 did not address the exact question. One paper was of relevance (table 2).

Comment(s)

Surprisingly few comparative studies. Ultimately small number studied in the study in question. Rigid definition of study population and reporter bias pose difficulties in such a study group. Diagnostic utility of V-Q questionable because of high proportion of inconclusive results—resource and economic factors are thus of relevance.

▶ CLINICAL BOTTOM LINE

There is not enough evidence to support V-Q Scintigraphy as the initial investigation of choice in COPD patients.

Hartmann I, Petronella H, Melissant C, et al. Effect of chronic obstructive pulmonary disease on the performance of D-dimer testing, ventilation/perfusion scintigraphy, spiral computed tomographic angiography, and conventional angiography. *Am J Crit Care Med* 2000;**162**:2232–7.

Combining clinical probability and ventilation-perfusion scan for diagnosis of pulmonary embolism

Kerstin Hogg, *Clinical Research Fellow*
Ged Brown, *Specialist Registrar*

Abstract

A short cut review was carried out to establish whether clinical probability estimates improve the utility of VQ scan results in patients being investigated for possible pulmonary embolus. Altogether 387 papers were found using the reported search, of which six presented the best evidence to answer the clinical question. The author, date and country of publication, patient group studied, study type, relevant

Table 2

Author, date and country	Patient group	Study type (level of evidence)	Outcomes	Key results	Study weaknesses
Hartmann I et al, 2000, Netherlands	627 patients (91 COPD, 536 non-COPD) with suspected PE diagnosis	Diagnostic study	Proportion of diagnostic VQ scans and CT pulmonary angiograms from both groups	54% of VQ scans in COPD group ruled in/out PE v 79% of VQ scans in non-COPD group	Observational groups not evenly matched
	PE inclusion (angiography or high probability V-Q) PE Exclusion (normal angiography or perfusion scintigraphy)		Sensitivity and specificity of VQ and CT in both groups	All CT pulmonary angiograms gave a rule in/rule out result. No statistical difference between the two groups	Questionable inclusion COPD criteria No power calculation

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

Clinical scenario

A 20 year old woman presents to the emergency department with shortness of breath and chest pain. Her D-dimer level is abnormal and you have sent her for a ventilation-perfusion scan. The scan result is reported as ''low probability for pulmonary embolic disease, however this does not rule out pulmonary embolism''. You have assigned her a low clinical probability of pulmonary embolism score and wonder if this helps interpret the scan.

Three part question

In [patients who have undergone ventilation-perfusions scans for possible pulmonary embolus] does [combining clinical probability of pulmonary embolism and ventilation-perfusion scan result] increase the [diagnostic utility]?

Search strategy

Medline using the OVID interface 1966-07/03. [exp pulmonary embolism/ OR pulmonary embol$.mp. OR PE.mp. OR exp thromboembolism/ OR pulmonary infarct$.mp.] AND [exp nuclear medicine/ OR exp ventilation-perfusion ratio/ OR ventilation-perfusion.mp. OR ventilation perfusion.mp. OR

Table 3

Author, date and country	Patient group	Study type (level of evidence)	Key results	Outcomes	Study weaknesses
PIOPED investigators, 1990, USA	931 ?PE patients at six centres. All underwent clinical probability scoring, VQ scan and pulmonary angiogram. 69 patients with normal VQs and 106 others did not undergo the pulmonary angiogram All followed up clinically for a year	Prospective diagnostic study	Accuracy of combining clinical probability with VQ scan results	High probability VQ scans—with high clinical probability 28 of 29 had PE—with moderate clinical probability 70 of 80 had PE Normal VQ scans— 5 of 128 PEs regardless of clinical probability Low probability VQ scan—with low clinical probability 4 of 90 had PE. No other combination was diagnostic	Only 30% patients were from the emergency department Subjective clinical probability score assigned by clinicians Radiologists not blinded to VQ scan results when interpreting pulmonary angiograms
Miniati M et al, 1996, Italy	890 patients ?PE had a perfusion scan. 413 of 670 patients with abnormal perfusion scan had a pulmonary angiogram. All abnormal perfusion scan patients were followed up for one year	Prospective diagnostic study	Accuracy of combining clinical probability with Q scan results	Q scans compatible with PE—with high clinical probability 222 of 225 had PE—with moderate clinical probability 70 of 75 had PE Abnormal Q scans not compatible with PE-with low clinical probability 4 of 127 had PE. No other combination was diagnostic	Only 13% patients were from the emergency department Patients with normal/near normal perfusion scans were not followed up after discharge Physicians rated clinical probability of PE subjectively
Wells PS et al, 1998, Canada	1239 patients ?PE underwent a clinical probability assessment, VQ scan +/− serial Doppler scans. All patients negative for PE were followed up clinically for three months	Management study	Accuracy of combining clinical probability with VQ scan results	Normal VQ scans— 4 of 334 had PE/DVT regardless of clinical probability Low/intermediate probability VQ scan— 13 of 454 with low clinical probability had PE/DVT No other combination was diagnostic	Complex clinical probability scoring system
Perrier A et al, 2000, Quebec and Geneva	180 patients from two centres with non-diagnsotic (low and intermediate probability) lung scan and low clinical probability, followed up for three months	Prospective management study	Three month outcome of patients with low clinical probability and non-diagnostic VQ scan	8 of 175 patients had DVT/PE diagnosed. 4.4% false negative rate False negative rate lowered to 1.7% when serial Doppler ultrasound carried out on all patients	Physicians rated clinical probability of PE subjectively. Patients presenting with symptoms of DVT were excluded
Barghouth G et al, 2000, Switzerland	143 consecutive ?PE patients in acute medical ward. Nine lost to follow up excluded. Decision algorithm used to isolate those requiring pulmonary angiogram, based on VQ scan result and clinical probability score	Retrospective management study	Number of pulmonary angiograms ordered Number of recurrent thromboembolic events in next two years	20% patients 4 DVTs diagnosed in patients without diagnosis of PE (101 total)—?false negatives. No further events	Subjective clinical probability score assigned by clinicians. Decision algorithm not detailed. Eight patients were anticoagulated for reasons other than DVT/PE during follow up. Follow up not robust and carried out retrospectively
Nilsson T et al, 2001, Sweden	170? PE patients 1991–1994. All had clinical probability score, Q or VQ scan, pulmonary angiogram, and six month follow up	Prospective diagnostic	Accuracy of combining clinical probability with Q or VQ scan results	High probability VQ scans—with high clinical probability 17/17 had PE—with moderate clinical probability 10/10 had PE Normal VQ scans—0 of 27 PEs regardless of clinical probability. Low probability VQ scan—with low clinical probability 1 of 34 had PE. No other combination was diagnostic	Physicians used a visual analogue scale (VAS) rather than objective clinical probability score. Nuclear physicians used PIOPED criteria to report VQ scans but then went on to give subjective VAS result as probability PE. No description of follow up methodology or completion

VQ.mp. OR lung scan.mp.] AND [exp Risk Assessment/ OR risk assessment.mp. OR risk stratification.mp. OR probability.mp] LIMIT to human AND English.

Search outcome
Altogether 387 papers found of which six addressed the question and are shown in table 3.

▶ CLINICAL BOTTOM LINE
All ventilation-perfusion scans must be interpreted with an independent clinical probability score.

The Pioped Investigators. Value of the ventilation/perfusion scan in acute pulmonary embolism. *JAMA* 1990;**263**:2753–9.
Miniati M, Pistolesi M, Marini C, *et al.* Value of perfusion lung scan in the diagnosis of pulmonary embolism: results of the Prospective Investigative Study of Acute Pulmonary Embolism Diagnosis (PISA-PED). *Am J Respir Crit Care Med* 1996;**154**:1387–93.
Wells PS, Ginsberg JS, Anderson DR, *et al.* Use of a clinical model for safe management of patients with suspected pulmonary embolism. *Ann Intern Med* 1998;**129**:997–1005.
Perrier A, Miron MJ, Desmarais S, *et al.* Using clinical evaluation and lung scan to rule out suspected pulmonary embolism: Is it a valid option in patients with normal results of lower-limb venous compression ultrasonography? *Arch Intern Med* 2000;**160**:512–16.
Barghouth G, Yersin B, Boubaker A, *et al.* Combination of clinical and V/Q scan assessment for the diagnosis of pulmonary embolism: a 2-year outcome prospective study. *Eur J Nucl Med* 2000;**27**:1280–5.
Nilsson T, Mare K, Carlsson A. Value of structured clinical and scintigraphic protocols in acute pulmonary embolism. *J Intern Med* 2001;**250**:213–18.

Serum amylase and acute pancreatitis

Report by John Butler, *Consultant*
Checked by Damian Bates, *Specialist Registrar*
Abstract

A short cut review was carried out to establish whether a normal serum amylase value rules out the diagnosis of acute pancreatitis. Altogether 191 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 outcomes, results and study weaknesses of these best papers are tabulated. A clinical bottom line is stated.

Clinical scenario
A 44 year old man presents to the emergency department with a four hour history of severe epigastric pain. You consider a diagnosis of pancreatitis and organise a serum amylase to be taken. You wonder whether a single normal serum amylase result is sufficiently sensitive to rule out pancreatitis in this patient.

Three part question
In [patients with abdominal pain] does [a normal serum amylase] exclude [the diagnosis of pancreatitis]?

Search strategy
Medline 1966-07/03 and Embase 1980-07/03 using the OVID interface. [({exp Abdominal pain/ OR abdominal pain.mp} OR {exp Pancreatitis/ OR pancreatitis, acute necrotising/ OR pancreatitis, alcoholic/ OR pancreatitis.mp}) AND {exp Amylases OR amylase$ OR amylase.mp}] AND [exp Sensitivity and Specificity OR (sensitivity.mp AND specificity.mp)] LIMIT to human AND English.

Search outcome
Altogether 191 papers found of which four papers were relevant to the original question (table 4).

Comment(s)
The gold standard for the diagnosis of pancreatitis is considered to be surgical examination at laparotomy or pancreatic histology. Often in practice such information is either unavailable or obtained at postmortem examination. In the absence of a readily available gold standard it becomes necessary to evaluate serum diagnostic markers against radiological methods such as CT. Only two studies used an independent ''gold standard'' for all patients to compare the

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Table 4

Author, date and country	Patient group	Study type (level of evidence)	Outcomes	Key results	Study weaknesses
Steinberg WM *et al*, 1985, USA	39 patients with pancreatitis were compared with 127 controls with abdominal pain	Diagnostic study	Sensitivity and specificity of two amylase serum assays for pancreatitis. Using upper limit of normal. Using best cut off	Amylase 1 = sensitivity 94.9% specificity 88.9%. Amylase 2 = sensitivity 94.9% specificity 86.0%. Amylase 1 = sensitivity 94.8% specificity 98.4% Amylase 2 = sensitivity 92.3% specificity 100%	Various techniques used to confirm diagnosis including CT scans, laparotomy, USS scans. Patients referred to gastroenterology team with diagnosis based on serum amylase result
Lin XZ *et al*, 1989, Taiwan	62 consecutive patients with image verified pancreatitis, and 414 patients with an acute abdomen	Diagnostic study	Sensitivity and specificity of serum amylase at selected cut off three times above upper limit of normal	Sensitivity of serum amylase: 84% in image proven pancreatitis 92% in patients with or without image verified disease	Problems with gold standard diagnosis of pancreatitis Serum amylase used in diagnosis Various gold standards used within the study
Clavien PA *et al*, 1989, Canada	352 consecutive attacks of acute pancreatitis in 318 patients	Diagnostic study	Sensitivity and specificity of serum amylase (<160 IU/l) compared with gold standards of CT or laparotomy	Sensitivity of 81% at presentation	Chronic pancreatitis patients were excluded
Winslet M *et al*, 1992, UK	417 patients with acute pancreatitis	Diagnostic study	Sensitivity of serum amylase (>1000 IU) for detecting acute pancreatitis at hospital admission	Mild cases 96.1%. Severe cases 87.4%. Alcohol subgroup 86%	Variable gold standards used
			Sensitivity of serum amylase (>1000 IU) for detecting acute pancreatitis at 48 hours	Mild cases 33.3% Severe cases 48.2%. Alcohol subgroup 76%.	Not all patients had CT

diagnostic test under consideration. Despite this weakness all the above studies except one reported sensitivities below 95%, especially in alcohol related pancreatitis cases.

▶ CLINICAL BOTTOM LINE

In patients presenting to the emergency department with acute abdominal pain a normal serum amylase concentration is not sufficiently sensitive to rule out the diagnosis of acute pancreatitis.

Steinberg WM, Goldstein SS, Davis ND, *et al.* Diagnostic assays in acute pancreatitis. *Ann Intern Med* 1985;**102**:576–80.
Lin XZ, Wang SS, Tsai YT, *et al.* Serum amylase, isoamylase, and lipase in the acute abdomen. Their diagnostic value for acute pancreatitis. *J Clin Gastroenterol* 1989;**11**:47–52.
Clavien PA, Robert J, Meyer P, *et al.* Acute pancreatitis and normoamylasemia. Not an uncommon combination. *Ann Surg* 1989;**210**:614–20.
Winslet M, Hall C, London NJ, *et al.* Relation of diagnostic serum amylase levels to aetiology and severity of acute pancreatitis. *Gut* 1992;**33**:982–6.

Ultrasonic guidance and the complications of central line placement in the emergency department

Report by Joel Dunning, *RCS Research Fellow*
Checked by James Williamson, *Clinical Fellow*

Abstract

A short cut review was carried out to establish whether ultrasonic guidance reduces the complication rate during central line placement in the emergency department. Altogether 349 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

You are evaluating a 90 kg acutely dyspnoeic diabetic woman in the emergency department. She has a history of left ventricular failure and was an inpatient only two weeks ago with a small myocardial infarction. Her BP is only 90/50 and you feel that she is a high risk patient with poor peripheral venous access who may need high dependency care possibly with inotropes, and you therefore decide that a central line would be of great benefit. Your department has just bought a handheld USS probe and you wonder whether it is worth having a go with this rather than your usual blind landmark technique.

Table 5

Author, date and country	Patient group	Study type (level of evidence)	Outcomes	Key results	Study weaknesses
Randolph AG *et al*, 1996, USA	Eight randomised controlled studies identified from Medline search from 1966 to 1995 Studies were using operators with low experience but no studies were in the emergency department	Meta-analysis	Meta-analysis of the relative risk of various clinical variables	Central line placement failure 0.32 (0.18 to 0.55)	Medline search only, no systematic review
				Complications during catheter placement 0.22 (0.10 to 0.45) Need for multiple catheter placement attempts 0.60 (0.45 to 0.79)	Poor search strategy
NICE guidelines, 2002, UK	Systematic review of the literature	Systematic review and meta analysis	Recommendations	Use of 2-D USS should be considered in most clinical situations where a central line is necessary electively or in an emergency	Grades of recommendation not provided
	20 RCTs evaluating ultrasound guidance for central line placement found		Meta-analysis of relative risks of various clinical outcome measures	No. failed catheter placements RR: 0.16 (0.09 to 0.3) No. complications odds: 0.36 (0.17 to 0.36) risk of failure RR: 0.59 (0.39 to 0.88)	Few studies on non-anaesthetist personnel in the Emergency department
	Only two were performed in the emergency room setting, with seven in ITU, and the remainder in elective scenarios			Number of fewer attempts RR 1.62 (2.57 to 0.67) Number of seconds saved 76 (96–63) Number of arterial punctures saved 90 per 1000 patients	
	Only four studies were clearly performed by non-anaesthetists		Cost effectiveness	The extra cost is likely to be about £10 patient, although the machines cost £7000–£15000 initially	
Miller AH *et al*, 2002, USA	122 emergency medical patients designated as "difficult insertions" randomised to the Landmark technique (n=71) or 2-D USS guidance technique (n=51)	Cohort study	Time from needle touching skin to successful flashback	Landmark group 463 s +/−627 s SS group 93 s +/−176 s p<0.0001	The insertion time may only represent a small amount of the total time taken to set up an USS guided central line insertion
	Difficult patients defined as peripheral vascular disease, coagulopathy, obesity, abnormal anatomy, or history of intravenous drug misuse		Number of attempts	Landmark group 3.54 +/−2.7 USS group 1.55 +/−1 p<0.0001	
			Complications	Landmark group 14% USS group 12% p=0.780	

Three part question

In [patients in the emergency department requiring a central line] is [USS guidance better than blind landmark techniques] at [reducing the complications of insertion]?

Search strategy

Medline 1966-07/03 using the OVID interface. [(exp Ultrasonography/ OR ultrasound.mp) AND (exp Catheterization, Central Venous/ OR central venous catheter.mp OR central line.mp)] LIMIT to human AND English

Search outcome

Altogether 349 papers were found of which two represented the best evidence. This included a meta-analysis and an additional paper. In addition a second meta-analysis not indexed on Medline was identified by cross referencing (table 5).

Comment(s)

Two meta-analyses were identified in this area and only one additional paper could be found that neither meta-analysis included. Both meta-analyses provide strong evidence that USS guided placement significantly reduces complications during catheter placement, number of attempts at insertion and reduction in the number of attempts at insertion for both neck and femoral line insertion. In addition and the NICE meta-analysis provides evidence that insertion time is quicker although this evidence is less convincing. NICE also imply that if used regularly the cost implication could be as little as £10 per patient although they acknowledge a projected £29 million cost for initial NHS implementation for equipment and training.

► CLINICAL BOTTOM LINE

There is good evidence that USS guided placement of central lines reduces the complication rate associated with this procedure.

Randolph AG, Cook DJ, Gonzales CA, et al. Ultrasound guidance for placement of central venous catheters: a meta-analysis of the literature. Crit Care Med 1996;**24**:2053–8.
National Institute for Clinical Excellence. Guidance on the use of ultrasound locating devices for placing central venous catheters. Technology appraisal guidance no 49 2002 http://www.org.uk/cat.asp?c = 36752 (accessed 3 Feb 2003).
Miller AH, Roth BA, Mills TJ, et al. Ultrasound guidance versus the landmark technique for the placement of central venous catheters in the emergency department. Acad Emerg Med 2002;**9**:800–5.

The utility of the tongue blade test for the diagnosis of mandibular fracture

Report by Rashmi Malhotra, Medical Student
Checked by Joel Dunning, RCS Research Fellow

Abstract

A short cut review was carried out to establish whether the tongue blade test is useful in the clinical assessment of patients with mandibular trauma. Altogether 269 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

Table 6

Author, date and country	Patient group	Study type (level of evidence)	Outcomes	Key results	Study weaknesses
Alonso LL and Thomas TB, 1995, USA	110 consecutive patients in the emergency department with jaw pain	Diagnostic study	Patient ability to grasp a tongue blade/depressor between his teeth and hold the blade against a twisting motion, with the ability to crack the tongue blade on both sides defined a negative test	Sensitivity of tongue blade test: 45 positive of 47 fractures, sensitivity 95.7%, CI (85.5 to 99.5%)	No sample size estimates—sample used too small
	Exclusion criteria: patients unable to cooperate because of age, language barrier, inability to open mouth because of pain, intoxication or head injury		Inability to crack tongue blade on both sides of the mandible defined positive test	Specificity of tongue blade test: 23 positive TBT of 63 non-fractures, specificity 63.5%, CI (50.4 to 75.3%)	"Gold standard" radiologist interpretation sensitivity measured in an other study in this hospital and was found to be only 95.5% Single radiologist to report radiographs—no double reporting
Robert A et al, 1998, USA	119 patients with jaw pain after trauma presenting at the emergency department	Diagnostic study	Patient ability to grasp a tongue blade/depressor between his teeth by and then to hold the blade against mild resistance by the examiner	Sensitivity of tongue blade test: 42 positive of 44 fractures, sensitivity 95%	No OPG despite panoramic series known to be more sensitive than mandibular series in detecting mandibular fracture Single radiologist to report radiographs—no double reporting No interobserver variability measurements No CIs calculated Incorrect use of χ^2 test—number too small should have used Fisher's exact test
	Exclusion criteria: airway compromise, inability to perform or cooperate with clinical examination, edentulousness		Inability to hold tongue blade against resistance on either hemimandible defined as a positive test	Specificity of tongue blade rest: 25 positive TBT of 75 non-fractures, specificity 67%	No sample size estimates—sample used too small

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

Clinical scenario

You are evaluating a patient who has attended the emergency department having just been punched on the jaw. He is having difficulty opening his mouth and talking but you can see no step deformity or loose teeth. You recall that while you were on elective you saw the tongue blade test being used routinely in America to select patients for mandibular imaging. For this test the patient is asked to bite on the tongue blade and if the examiner can break the blade while the patient grips it, the patient does not need a mandibular radiograph. You wonder whether this is a sensitive test to use in this patient.

Three part question

In [patients with mandibular trauma] is [the tongue blade test] a good diagnostic test for [mandibular fracture]?

Search strategy

Medline 1966-7/03 using the OVID interface. [(mandibular fracture.mp.OR exp Mandibular Fractures/) OR {(exp fractures OR fracture$.mp) AND (exp mandible OR mandible$.mp or mandibular.mp)}] AND exp diagnosis OR diagnosis.mp AND maximally sensitive RCT filter LIMIT to human AND English.

Search outcome

Altogether 269 papers were found of which two were relevant and are listed in table 6.

Comment(s)

No confidence intervals were calculated by Roberts *et al* for the reported sensitivity of the tongue blade test so we calculated this ourselves: sensitivity 95.4% (CI 84.53% to 99.44%). The confidence intervals are comparatively wide and so the tongue blade test could not stand on its own as a single diagnostic tool in screening for mandibular fractures since missing these fractures can lead to serious long term complications.

The high sensitivities reported by both these studies do suggest, however, that the tongue blade test is a useful screening tool in evaluating patients with mandibular fracture but other clinical predictors must also be considered.

▶ CLINICAL BOTTOM LINE

The tongue blade test is useful in evaluating patients with possible mandibular fracture

Alonso LA, Purcell TB. Accuracy of the tongue blade test in patients with suspected mandibular fracture. *J Emerg Med* 1995;**13**:297–304.
Robert A, Schwab MD, Robinson WA. Clinical predictors of mandibular fractures. *Am J Emerg Med* 1998;**16**:304–5.