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SHORT COMMUNICATION

The use of imaging in acute pancreatitis in United Kingdom hospitals: findings from a national quality of care study

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Objective: To assess use of imaging in patients admitted to UK hospitals with acute pancreatitis (AP).

Methods: 4,479 patients had a diagnosis AP in the first 6 months of 2014. The National Confidential Enquiry into Patient Outcome and Death (NCEPOD) selected patients with more severe AP for case review. Clinicians completed 712 questionnaires and case reviewers assessed 418 cases. The use of imaging in patients with AP is reported.

Results: The common causes of AP were gallstones (46.5%) and alcohol excess (22%) with no cause identified in 17.5%. Imaging was needed to diagnose AP in 12%. 60.1% of patients had one or more CT scan. The timing of the CT scan(s) was appropriate in 90% of patients. The number of CTs was appropriate in all except 6.6% (equally split between too many and too few). AP collection intervention was radiological in 49/613 and surgical in 23/613. 69.8% had an ultrasound scan which diagnosed gallstones in 46.4% and bile duct dilatation in 12.9%. At least 21% had ultrasound scan inappropriately omitted. The National

Confidential Enquiry into Patient Outcome and Death recommends gallstones are excluded in all patients with AP, including suspected alcohol-related AP. 29.8% underwent magnetic resonance cholangiopancreatography diagnosing gallstones in 62.4%, bile duct dilatation in 25.4% and common bile duct stones in 14.4%. 20.6% had recurrent pancreatitis with gallstones accounting for a third. 17% with gallstone AP had a cholecystectomy within the guideline recommended time period.

Conclusion: Imaging is rarely required for the diagnosis of AP. CT is used responsibly in AP management. Imaging should be used more to exclude gallstones, including in presumed alcohol related AP. Increased diagnostic efforts will not reduce recurrent biliary AP unless matched by earlier gallstone treatment.

Advances in knowledge: Whilst CT is used responsibly in AP greater use of other diagnostic modalities is required to identify reversible causes, in particular gallstones, in order to prevent recurrent AP.

INTRODUCTION

Acute pancreatitis (AP) is an acute inflammatory process affecting the pancreas, most commonly caused by gallstones (50%) or alcohol excess (25%). A UK hospital serving a population of 300,000–400,000 people will admit around 100 patients with AP each year.¹ There is a spectrum of severity. In 80% it is a self-limiting condition requiring hospital admission for a few days. In 20% it is severe with prolonged hospital stays, multiple organ failure, a need for critical care support and a 15–20% risk of death.²

METHODS AND MATERIALS

The National Confidential Enquiry into Patient Outcome and Death (NCEPOD) is an independent organization whose remit is to review medical and surgical practice and make recommendations to improve the quality of the delivery of care. This paper describes the use of imaging in AP as reported in the quality of care study “Treat the Cause” published by the NCEPOD in 2016.³ Data were obtained from questionnaires completed by the consultant clinician caring for the patient (<http://www.ncepod.org.uk/pdf/current/AP/APClinicalQuestionnaire.pdf>), organizational questionnaires (<http://www.ncepod.org.uk/pdf/current/AP/>

[APOrganisationalQuestionnaire.pdf](#)) and structured multidisciplinary case note review. The clinical questionnaires detailed what happened to the patient and the case note review questionnaires were more focussed on the quality of care and what could have been done better.

14,479 patients were identified by NCEPOD as having a hospital admission with a primary diagnosis of AP during the first 6 months of 2014. The multidisciplinary study advisory group considered that opportunities to improve care were more likely in those with more severe pancreatitis. Inclusion criteria were one or more of (1) an inpatient stay of 3 or more days, (2) admission to critical care and (3) death in hospital. A random sample of 987 patients was selected (up to five cases per hospital) for inclusion; 712 (72%) completed clinician questionnaires and 697 copies of case notes were returned to NCEPOD. The case reviewers were able to assess 418 cases. The commonest reason for the case reviewers not being able to assess the case notes was because they were incomplete. The denominator varies in the data according to whether it comes from the clinical questionnaires or the case reviewers and whether the question was answerable.

RESULTS WITH DISCUSSION

As the case review was focussed on patients with more severe AP, and smaller hospitals were likely over-represented by the sampling of a maximum of five case per hospital, some of the numbers described will not be extrapolatable to the wider unselected AP population.

Patient characteristics

Optimal care of patients with AP requires timely diagnosis, assessment of severity, fluid resuscitation to maintain tissue perfusion and prevent end-organ damage, nutritional support, analgesia, management of co-morbidities, appropriate use of antibiotics, early recognition of deterioration with escalation of care and prompt attention to the underlying cause to prevent recurrence.

The clinician caring for the patient reported the cause as gallstones in 46.5% and alcohol excess in 22%. In 17.5% no underlying cause was identified. The median age for alcohol related AP (49.5 years) was approximately 20 years younger than gallstone (67 years) and unknown cause AP (69 years).

Idiopathic pancreatitis should account for 10%.¹ Rare causes include microlithiasis, drugs (e.g. valproate, steroids, azathioprine), pancreas divisum, hypertriglyceridaemia or lipoprotein lipase deficiency, hypercalcaemia and some viral infections (mumps, coxsackie B4). More diligent clinico-radiological assessment would be expected to increase the diagnostic rate and diminish recurrent AP.

In the total AP population of 14,479 for the study period, 52% (7,572) were coded with the ICD10 code for unspecified AP. Failure to identify the underlying cause has implications for the individual patient in preventing recurrent pancreatitis but also may influence the commissioning of services such as gallstone identification and removal, and alcohol cessation therapy.

Gallstone pancreatitis was more common in female patients (40 vs 21.6%) and "alcohol induced pancreatitis" in males (18.7 vs 6.5%) when a cause was coded.

Diagnosis of acute Pancreatitis

AP is diagnosed if two out of three of the following criteria are fulfilled:

- (1) Upper abdominal pain.
- (2) Serum amylase or lipase above three times the upper limit of normal.
- (3) CT or magnetic resonance imaging (MRI) shows pancreatic inflammation.

In the opinion of the case reviewers AP was diagnosed appropriately in 96.5%. In 12% (50/418), who did not have both characteristic pain and elevated enzymes on presentation, a CT or MR was required to establish the diagnosis.

Severity and complications

In severe AP CT and MRI are used to confirm the severity, diagnose complications, guide treatments and monitor resolution.

CT scanning was much more commonly used than MRI to detect and stage complications of acute severe pancreatitis, especially pancreatic necrosis with just under two-thirds (60.1%) of patients having one or more CT scan. The full extent of pancreatic necrosis cannot be appreciated until at least 3 days after the onset of symptoms so the optimal timing for initial CT assessment is at least 72–96 h after presentation.⁴ Additionally, patients with persisting organ failure, signs of sepsis or clinical deterioration occurring after an initial improvement will also commonly require a CT scan. The case reviewers considered that the timing of the CT scan(s) was appropriate in 90% (226/251) of patients.

The optimal interventional strategy for patients with suspected or confirmed infected necrotizing pancreatitis is initial image-guided percutaneous catheter drainage or endoscopic transluminal drainage, followed, if necessary, by endoscopic or surgical necrosectomy.⁵ Radiological, endoscopic and surgical intervention was performed in 49, 2 and 23 patients, respectively, of the 613 patients where it was known. Of the radiological procedures 38 were for drain insertion and nine percutaneous were fine needle aspirations for bacteriology.

Appropriateness of use of CT

The study advisory group recognized concerns about the possible overuse of CT in AP resulting in harm from unnecessary irradiation and increased risk of contrast induced nephrotoxicity. The case reviewers considered the number of CTs appropriate in all except 6.6% with an equal split between too many and too few. The reality of practice seems to be that CT is used responsibly.

Diagnosis of gallstones

It is important to exclude gallstones in all patients with AP as this is a common and readily correctable cause.

Right upper quadrant ultrasound is recommended during the index admission with AP.⁴ This was followed in the 482/691 (69.8%) patients who had an ultrasound scan (US) during their admission. US diagnosed gallstones in 46.4% and bile duct dilatation in 12.9%.

In the 209/691 (30.2%) who did not have an US, possible justifications were considered. Reasons included post endoscopic retrograde cholangio-pancreatography (ERCP) AP, gallstones known from other imaging, and severe pancreatitis resulting in death during the index admission. Investigations to look for gallstones were planned as an outpatient in 11/209; ideally gallstones should be diagnosed as early as possible to prevent avoidable recurrent AP. 54/209 patients had a previous AP admission and so clinical teams may have known or presumed that gallstones had been excluded previously, but this could not be assessed as the prior notes were not available. This leaves at best 21% (44/209) of patients with an inappropriately omitted US. 24/44 with no US were presumed to have alcohol related AP with no exclusion of other possible causes. NCEPOD recommends that gallstones should be excluded in all patients with AP, with a minimum of an abdominal US. This includes those thought to have alcohol-related AP, as gallstones are common in the general population.

When US does not show gallstones or biliary obstruction and in the absence of cholangitis and/or abnormal liver function tests suggesting biliary obstruction, magnetic resonance cholangio-pancreatography (MRCP) or endoscopic ultrasound (EUS) rather than diagnostic ERCP should be used to screen for occult choledocholithiasis.⁴ MRCP can detect gallstones as small as 3 mm with sensitivity of 98% when compared to ERCP.⁶ Although EUS is superior to MRCP in excluding small (<5 mm) gallstones, MRCP is less invasive, less operator-dependent and more widely available than EUS. An MRCP was performed in 29.8% (200/671) of patients. The MRCP scan identified gallstones in 62.4% (113/181) and bile duct dilatation in 25.4% (46/181). The particular benefit of MRCP is the ability to identify stones in the common bile duct. Ductal stones were identified in 14.4% (26/181) of the patients who had a MRCP.

NCEPOD recommends that after excluding the commoner causes of AP, those in whom the cause remains unknown should undergo MRCP and/or EUS to detect occult stones and rarer morphological causes.

Recurrent gallstone pancreatitis

Cholecystectomy prevents recurrent gallstone pancreatitis providing biliary duct stones are excluded by imaging (MRCP, EUS or intraoperative cholangiogram) or, if present, are removed by endoscopic or operative means. In patients unfit for cholecystectomy, endoscopic sphincterotomy prevents recurrent AP.

The best time to deal definitively with gallstones is during the index admission for patients with mild AP, after the initial symptoms have resolved.⁴ In severe biliary pancreatitis, cholecystectomy should be delayed until after peri-pancreatic collections resolve or for at least 6 weeks, at which time the risk of cholecystectomy is lower.⁴

The risk of recurrent biliary pancreatitis is directly related to the interval between first attack and cholecystectomy.⁷ UK commissioning guidance recommends cholecystectomy within 14 days of discharge for those with gallstone AP.⁸ In 43.8% of UK hospitals this is not followed in their local guidelines. English Hospital Episode Statistics data from the study period showed 17% of patients with gallstone AP had a cholecystectomy within 14 days.

A previous admission with pancreatitis was documented in 20.6% (143/694). The cause for the current episode was the same as the prior one in 93%. Gallstones were the cause of a recurrent AP admission in 40/132 (30.3%). 16 had no treatment for their gallstones and further 12 recurrent gallstone AP despite prior treatment (11 cholecystectomy, 1 ERCP), suggesting imaging to exclude bile duct stones was incomplete or was not performed.

Of 22 patients with a previous diagnosis of unknown cause, 11 had a cause identified on readmission with gallstones the commonest cause. Details of the prior admission were not available.

CONCLUSION

Imaging is not usually required for the diagnosis of AP. CT is important in the assessment of severity and the management of complications. CT is used responsibly. Both US and MRCP should be used more and earlier to exclude gallstones, including in those with presumed alcohol related AP. Increased diagnostic efforts will only be effective in reducing recurrent biliary AP if hospitals also follow the NCEPOD recommendation that gallstones should be definitively treated while an in-patient or within 2 weeks of discharge, unless there are clinical contraindications to early intervention.

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