Journal of Pediatric Surgery 53 (2018) 1360–1364

Contents lists available at ScienceDirect

Journal of Pediatric Surgery

journal homepage: www.elsevier.com/locate/jpedsurg

Diagnosis and management of omental infarction in children: Our 10 year experience with ultrasound☆

Robert McCusker [a,b,*], Roger Gent [c], Day Way Goh [b,d]

[a] School of Medicine, Faculty of Health Science, University of Adelaide, Adelaide, South Australia, Australia
[b] Department of Paediatric Surgery, The Women's & Children's Hospital, North Adelaide, South Australia, Australia
[c] Paediatric Ultrasound Service, Women's and Children's Hospital, North Adelaide, South Australia, Australia
[d] Discipline of Paediatrics, Faculty of Health Science, University of Adelaide, Adelaide, South Australia, Australia

ARTICLE INFO

Article history:
Received 13 December 2016
Received in revised form 24 January 2018
Accepted 3 February 2018

Key words:
Pediatric
Child
Omental infarct
Ultrasound
Omentectomy
Appendicitis

ABSTRACT

Aim: To review children with Omental Infarction (OI) and the role of Ultrasound Scan (US) in its diagnosis and management.
Methods: Cases of OI were identified retrospectively from 2004 to 2014 through screening of admission coding, pathology databases and radiology records. Demographic, clinical and pathological data were extracted from case records.
Main Results: 30 cases were identified (17 male, 13 female). Mean age was 10.7 years (range 3.5–17.2). The majority of the patients were grossly overweight, with 83.3% of patients weighing greater than the mean for their age. All patients underwent at least one US, 4 had a repeat US and 1 patient also had a CT to rule out appendicitis after a US demonstrating OI. OI was demonstrated in 26 initial USs; in 4 cases initial USs were negative but repeat USs correctly detected OI. In 34 USs the appendix was identified on 20 occasions (15 normal, equivocal in 5). 13 patients underwent surgery, while 17 were managed nonoperatively; 7 underwent omentectomy only, 5 had omentectomy plus appendicectomy and 1 underwent appendicectomy only. All 12 omentectomy specimens were confirmed as OI histologically while none of the 6 appendices showed inflammation histologically. There were no postoperative complications.
Conclusion: In a large series we have demonstrated the efficacy of US in the diagnosis and management of OI in children. To our knowledge this is the largest series of its kind to date. No patient with OI was incorrectly diagnosed with acute appendicitis or vice versa.
Level of evidence: Level IV.
Type of Study: Retrospective Case Series.

Omental Infarction (OI) is an uncommon cause of abdominal pain in children and may present similarly to acute appendicitis [1,2]. It represents a small fraction of all causes of acute abdominal pain [1,3] although the diagnosis is becoming more frequent [2,4–6] in part owing to the increasing sophistication of diagnostic imaging techniques including ultrasound (US) [7], computed tomography (CT) [8] and the advent of laparoscopy. Children represent up to 15% of all reported cases of OI, and it does not commonly occur before the age of 4 [1,6,9]. This is likely owing to the relative paucity of intraabdominal fat and omental mass in early childhood [10,11]. Obesity seems to be the most important risk factor for the development of OI [4,5] and the increasing rates of childhood obesity may be another factor in the increasing prevalence of OI in recent literature [2,5,12,13]. OI occurs either primarily, as a result of torsion or thrombosis of the vascular supply of the greater omentum, or secondary to other pathologies such as omental cysts or trauma [14] although this doesn't seem to alter the manner in which they present [2,15].

The symptoms of OI most often include a rapid onset of localized, usually right sided abdominal pain, sometimes after a heavy meal or a sudden movement. There may be gastrointestinal symptoms such as nausea, anorexia or diarrhea, although these are thought to be uncommon [2]. Traditionally the diagnosis was made at the time of surgery [1,11]. If diagnosed preoperatively, OI can be managed safely without surgical intervention and is a self-limiting, nonlethal condition [6,9,13,16–18]. The choice of surgical versus nonsurgical management continues to be debated [6].

☆ Presented at the Australian & New Zealand Association of Paediatric Surgery Annual Scientific Conference, Auckland, New Zealand. October 2015.

* Corresponding author at: Department of Paediatric Surgery, Women's & Children's Hospital, 72 King William Road, North Adelaide, South Australia, Australia. Tel.: +61 8161 7328 5067.
E-mail address: remccusker@gmail.com (R. McCusker).

https://doi.org/10.1016/j.jpedsurg.2018.02.047
0022-3468/

Our aim was to review whether US in our institution is useful in the diagnosis and management of children presenting with acute abdominal pain from an OI. We describe the clinical presentation, radiological features, management and outcome of 30 patients in our institution who were diagnosed with OI on ultrasound in a 10 year period.

1. Methods

Hospital records were interrogated for all cases of omental infarction using International Classification of Diseases code K55.0 (acute vascular disorders of the intestine) from the period of January 2004 until June of 2014. For the same period, a search of our histopathology database was performed for all reports containing the phrase "omental infarct OR infarction." Radiology reports which visualized an intraabdominal, echogenic mass and were reported as "omental infarction" had been collected prospectively during this period by the chief sonographer and were reviewed to ensure no cases were missed by the preceding search strategy. Cases were included if the patient presented to our hospital emergency department with acute abdominal pain or if the patient was admitted for the investigation and treatment of acute abdominal pain. Cases were excluded if the patient did not have any imaging including US or CT, if the OI was secondary to another pathology such as vasculitis or as in one such pathology specimen, OI identified in an incarcerated inguinal hernial sac.

Hospital records for all children were reviewed and all available data were extracted for patient demographics, clinical history, physical examination findings, laboratory results, radiological investigations, intraoperative descriptions, histopathology findings and details of inpatient progress, discharge circumstances and any complications or readmissions to the same institution or another within the state within a 30 day window. Weights were recorded and CDC weight z-scores were calculated from the CDC growth chart. Log linear regression was used to investigate the association between Length of Stay (LOS) and having surgery or not. The statistical software used was SAS 9.4 (SAS Institute Inc., Cary, NC, USA).

2. Results

There were thirty-six cases of OI identified in a 10 year period. Six cases were excluded; one because the OI was removed from an incarcerated inguinal hernial sac; one patient where OI was seen on a US two days after laparoscopy for histologically confirmed acute appendicitis; one patient where an echogenic omental mass was identified one week after laparoscopic treatment of perforated appendicitis; two patients where OI was identified during outpatient management of vasculitis and chronic abdominal pain respectively but neither requiring admission; one patient who had an omental infarction excised surgically without preoperative imaging, with a preoperative clinical diagnosis of appendicitis.

Of the thirty cases reviewed in depth, 17 were male (56.7%), with an average age of 10.7 years (range 3.5–17.2). Based on Z-scores calculated from the CDC Growth Chart, the majority of the children had a high body weight for their age (Fig. 1), with 11 (36.6%) in a weight range greater than 2 standard deviations above the mean for their age; 25 children (83.3%) were heavier than the mean weight for their age; and only 1 patient (3.3%) was significantly underweight. Body Mass Index (BMI) could not be calculated as height was not recorded in the case files.

The average duration of pain prior to presentation was 3 days and 22 h (range 12 h to 2 weeks).

Gastrointestinal symptoms were common, with 21 patients (70%) with anorexia, 16 (53.33%) with nausea, 8 (26.67%) with at least one episode of vomiting, 7 (23.33%) with at least one episode of diarrhea.

Pain was reported to migrate in 5 cases (16.67%) although only one case had a classic pattern suggestive of appendicitis. Tenderness of the abdomen was typically documented to be right sided (Fig. 2) with 25 instances (65.78%) of right lower quadrant (RLQ) tenderness; 8 cases

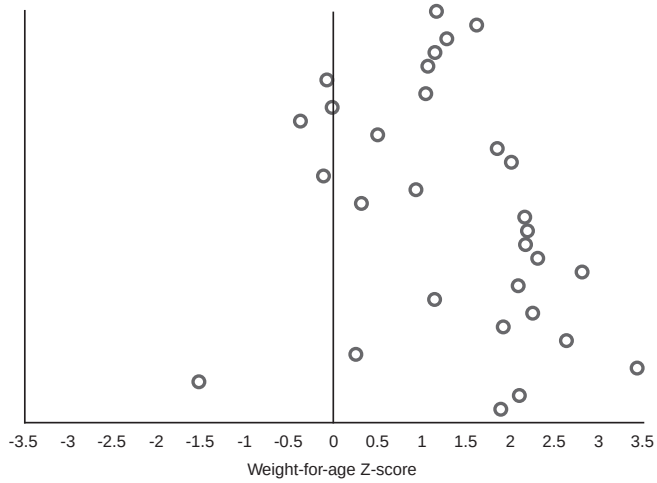

Fig. 1. Patients Weight-for-age Z-score per CDC Growth Chart.

(21.1%) of right upper quadrant (RUQ) tenderness; one (2.6%) with epigastric tenderness; one (2.6%) with periumbilical tenderness; one (2.6%) with left lower quadrant (LLQ) tenderness; and two (5.2%) with generalized abdominal tenderness (Fig. 2).

Eleven (36.66%) of the children had an objectively documented temperature greater than 37.5 °C.

Hematology tests showed an elevated White Cell Count (WCC) in 11 of the 30 cases (36.66%). The WCC was normal in 17 cases (56.66%) and the WCC was not tested in 2 cases (6.66%). In three cases, the neutrophil count was greater than or equal to 77% of the total WCC (10.7%).

Biochemistry tests showed an elevated C-Reactive Protein (CRP) in 17 of the 30 cases (56.67%), while the CRP was normal in 10 cases (33.33%). The CRP was not tested in 3 cases (10%).

All 30 patients underwent an ultrasound scan, and OI was correctly identified in 26 of those first scans (86.66%). All four cases where OI was not seen on the first scan underwent a repeat ultrasound and OI

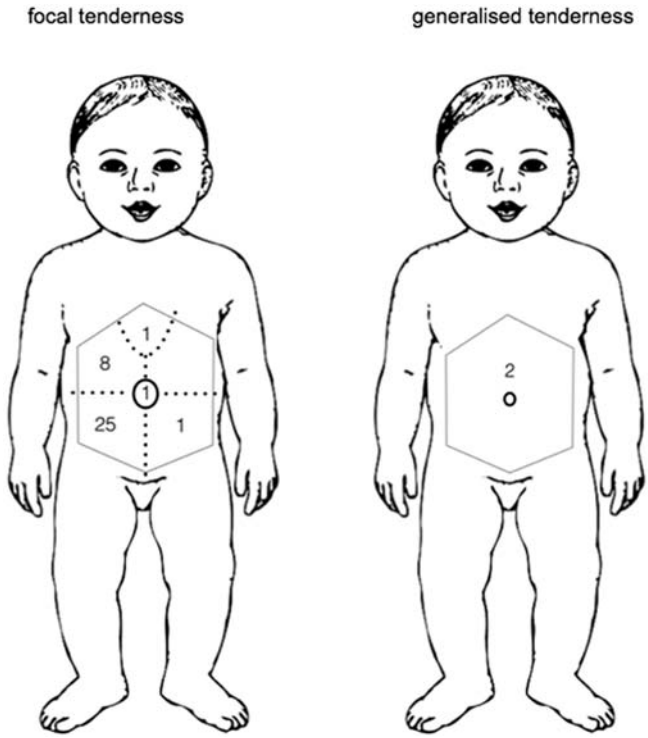

Fig. 2. Abdominal regions where tenderness was documented.