SAJS
Paediatric Surgery

Complicated umbilical hernia in childhood

R. A. BROWN, M.B. CH.B., M.PHIL. (ANCIENT CULTURES), D.C.H. (S.A.), F.R.C.S. (EDIN.), F.C.S. (SURG.) (S.A.)
A. NUMANOGLU, M.B. CH.B., F.C.S. (SURG.) (S.A.)
H. RODE, M.B. CH.B., M.MED. (SURG.) (PRET.), F.R.C.S. (EDIN.), F.C.S. (SURG.) (S.A.)

Department of Paediatric Surgery, Red Cross War Memorial Children's Hospital, School of Child and Adolescent Health, University of Cape Town

Summary

Umbilical hernias occur frequently in children but complications are rarely reported. This study assessed the incidence of complicated umbilical hernias in our patients, evaluated data for risk factors and reviewed our management in the light of these findings.

We conducted a prospective study of all children needing umbilical hernia repair for complications over a period of 15 years. Patients with para-umbilical and other ventral wall hernias were excluded. In total, 389 children had umbilical hernias repaired during this period (average age 6 years); 28 (7%) of these had complicated hernias. Symptoms included umbilical pain (100%), vomiting (71%) and constipation (28%). The average age of the complicated group was 3 years. All cases had a painful irreducible umbilical mass. Eleven of the 19 children who had an abdominal radiograph showed radiological evidence of small-bowel obstruction and in 5 children there was radiological evidence of pica. Two patients had ischaemic omentum that required resection. Patients who present with localised abdominal pain or an irreducible umbilical mass should be operated on promptly.

An umbilical hernia is a common childhood defect that occurs at the site of the cicatrised umbilical ring which closes concomitantly with the atrophy and obliteration of the umbilical vessels. The vast majority resolve spontaneously.[1] Complications such as irreducibility, obstruction and strangulation are rarely reported.[2] Possible predisposing factors for complications include pica, where sand may accumulate intraluminally and form an enterolith which cannot be reduced through the neck of the hernia because of its size, and ascarids, which may become entrapped and produce a similar clinical effect on the hernia.

The aim of this study was to determine the incidence of complicated umbilical hernia in our patients, to evaluate the data for risk factors, and to review our management in the light of the findings and the literature.

Materials and methods

Red Cross War Memorial Children's Hospital admits children up to the age of 13 years and has a catchment population of 2 million. A prospective review was done of all children who underwent complicated umbilical hernia repair at the hospital over a 15-year period (1991 - 2005). Patients with para-umbilical hernias and other ventral abdominal wall defects were excluded. Details were recorded of gender, age, race, weight, previous history, and symptoms and signs of complication. Note was also taken of gestational age, coexistent conditions, and radiological and operative findings. Complications were defined as irreducibility, bowel obstruction, or strangulation.

Results

Between 1991 and 2005, 389 children underwent umbilical hernia repair, of whom 28 (7.21%) had complicated hernias. Of these, 22 were black children and 6 were coloured.[3] Fourteen of the 28 children were female. The average age at surgery for uncomplicated hernia was 6 years, compared with 3 years for complicated hernia (range 9 months - 7 years). Twenty-three children were aged 4 years or younger. Two children were below the 3rd percentile for weight, 2 were on the 90th percentile, and the remainder were between the 20th and 50th percentiles.

Umbilical pain was present in all children. The duration ranged from 6 hours to 1 week, with the majority giving a 24-hour history of pain. Five children had been seen in hospital with umbilical pain in the 6 months preceding admission for an irreducible hernia. Additional symptoms included vomiting (in 20 patients, bile-stained in 2), and a history of constipation for 48 hours before admission in 8 cases.

In all patients, a tender irreducible mass was palpable at the umbilicus. In 5 cases the lump had reduced spontaneously by the time the child was examined in the casualty department. In 14 children, the complicated hernia was reduced in the casualty department or ward following sedation and/or analgesia. In 9 cases the hernia could only be reduced at operation under general anaesthesia.

All children with complicated umbilical hernias were admitted to hospital on presentation and underwent opera-

tive repair during the same admission. The size of the umbilical defect was recorded in 14 cases and ranged from 0.5 to 5 cm (mean 2.24 cm). The hernia contents were omentum (N = 6) and small bowel (N = 3). The small bowel was viable in all cases. In 2 children the omentum was necrotic and required resection. Children with pica and worms were treated for these conditions postoperatively. One child developed a superficial wound infection, and another an umbilical abscess that required incision and drainage.

Discussion

The quoted incidence of umbilical hernia in childhood varies widely. Several authors believe that the incidence is higher in black than white children,[1,2,4] although others have shown no significant differences.[5] Spontaneous closure of the defect has been described by Blumberg[5] as being similar to a sphincter. Elastic fibres that reinforce the umbilical ring in infants coupled with proliferation of the lateral connective tissue plates originally from the cord are responsible for this.[5] This is aided by the obliteration of umbilical vessels and fibrosis.

A recent review of the literature[6] could only identify 45 cases of complicated umbilical hernia in the world literature. Although not all published reports were included,[7] the relative number of complications is surprisingly small considering the ubiquity of the condition. Irreducibility is the main complication, with strangulation occurring less frequently.[8-11] In our study, 28 umbilical herniotomies were performed for initial irreducibility, with only 2 children having obstruction and strangulated omentum that required resection. The majority of complications (82%) occurred in children younger than 4 years, with an average age of 3 years. The average size of the fascial defect in cases where it was measured was 2.2 cm in our series and size did not seem to be related to the incidence of complications.

Complications were heralded by umbilical pain in every case. The majority complained of pain for about 24 hours before presentation. Often this was accompanied by vomiting, constipation or both. Five children had sought medical attention for umbilical pain in the 6 months before their definitive operation. Despite the contention that umbilical hernias do not cause symptoms, it is acknowledged that pain may occur at the site; intermittent omental entrapment as the hernia gets progressively smaller is proposed as a possible mechanism.[12]

The plain abdominal film was often helpful, confirming those patients with small-bowel obstruction in whom immediate resuscitation and appropriate surgical management was indicated, as well as identifying children with worm infestation and pica.

Seven per cent of all our patients with umbilical hernias required emergency repair for complications. Conservative management of these hernias must therefore be tempered with this knowledge.[13] Complications are more common in black children, which may reflect their increased incidence of umbilical hernia.[14]

Defect size has been proposed as a predictive factor for complications, but small defects (i.e. < 1.5 cm) may be more likely to complicate.[2] In our series the average defect size was 2.24 cm. Average age at surgery was 3 years, suggesting that children with smaller defects at a younger age are more at risk for complications. Umbilical hernias can close up to the age of 14 years without complications. The only constant indication of potential complication was a history of localised umbilical pain or an intermittent mass at the site of the hernia. Because of our documented incidence of complications (7% in this series), we advocate that surgery should be performed around the age of 5 years if there is still a persistent defect > 2 cm, or immediately if there is a preceding history of localised umbilical tenderness or a mass at the site. However if there is significant protrusion of abdominal contents closure may be advanced to prevent rupture and for cosmetic reasons.

Vrsansky and Bourdelat[6] and Ameh *et al*.[15] have emphasised the potential for umbilical hernias to complicate in what has been believed to be a benign surgical condition. Haller *et al*.[16] reported a 6% mortality rate and 9-day hospitalisation for adults undergoing emergency surgery for an 'incarcerated' umbilical hernia. Our series supports their plea for increased vigilance of umbilical hernias in children. Certainly expectant conservative management can continue; however it should be replaced by surgery in the case of children with a history of local tenderness or an intermittent mass at the site of the umbilical hernia. Parents of young children with umbilical hernial defects should also be alerted about the signs (mass) and symptoms (tenderness) of potential complications of the hernia.

REFERENCES

1. Hall DE, Roberts KB, Charneey E. Umbilical hernia: what happens after age 5 years? *J Pediatr* 1991; **98**: 415-417.
2. Lassaletta L, Fonkalsrudd EW, Tovar JA, *et al*. The management of umbilical hernias in infancy and childhood. *J Pediatr Surg* 1975; **10**: 405-409.
3. Elliot MS, Louw JH. A 10-vear survey of large bowel carcinoma at Groote Schuur Hospital with particular reference to patients under 30 years of age. *Br J Surg* 1979; **66**: 621-624.
4. Mack M. The incidence of umbilical hernia in Africans. *East Afr Med J* 1945; **22**: 369.
5. Blumberg NA. Infantile umbilical hernia. *Surg Gynecol Obstet* 1980; **150**: 187-192.
6. Vrsansky P, Bourdelat D. Incarcerated umbilical hernia in children. *Pediatr Surg Int* 1997; **12**: 61-62.
7. Mawera G, Muguti GL. Umbilical hernia in Bulawayo: some observations from a hospital based study. *Cent Afr J Med* 1994; **40**: 319-323.
8. Audlist AW, Lugg P. Strangulation of an umbilical hernia in a child of six months. *Aust Paediatr J* 1982; **18**: 266.
9. Jeans PL, Wright JE. Strangulated umbilical hernia in infancy. *Aust Paediatr J* 1984; **20**: 75.
10. Mestel Al, Burns H. Incarcerated and strangulated hernias in infants and children. *Clin Pediatr* 1963; **2**: 368-370.
11. Rudran V, Jones R. Strangulated umbilical hernia in a child (Letter). *Br J Gen Pract* 1992; **42**:440-441.
12. Vyas ID, MacKinnon AE. Strangulated umbilical hernia in a child. *Post-grad Med J* 1983; **59**:794-795.
13. Papagrigoriadis S, Browse DJ, Howard ER. Incarceration of umbilical hernias in children: a rare but important condition. *Pediatr Surg Int* 1998; **14**: 231-232.
14. Meier DE, Ola Olorun DA, Amodele RA, Nikoe SK, Tarpley JL. Incidence of umbilical hernia in African children; redefinition of 'normal' and re-evaluation of indication for repair. *World J Surg* 2001; **25**: 645-648.
15. Ameh EA, Chirdan LB, Nmadu PT, Yusufu LMD. Complicated umbilical hernias in children. *Pediatr Surg Int* 2003; **19**: 280-282.
16. Haller JA, Morgan WN, Stumbaugh S, White JJ. Repair of umbilical hernias in childhood to prevent adult incarceration. *Am Surg* 1971; **37**: 245-246.