

Case Report

Torsion of Meckel's diverticulum—a case report and literature review

Kah A. Ho^{1,*}, Rajkumar Srinivasan²

¹Faculty of Medicine and Health, School of Clinical Medicine, UNSW, Sydney, NSW, Australia

²Bankstown Hospital, UNSW, Sydney, NSW, Australia

*Corresponding author. E-mail: kahannho@gmail.com

Abstract

Meckel's diverticulum (MD) is the most common congenital anomaly of the gastrointestinal tract. Torsion is a rare complication of MD with only 48 cases described in the English literature to date. We describe a case of a 22-year-old male who presented to the emergency department with lower abdominal pain. Pre-operative computed tomography scan suggested a tortured MD. This was confirmed on diagnostic laparoscopy and managed with segmental resection of the MD and a concurrent appendicectomy. Histopathology confirmed torsion of MD and a normal appendix. The patient recovered well without any complications. Torsion occurs invariably with giant MD defined as a length of >5 cm. Surgical options for MD include diverticulectomy, wedge resection and segmental resection via laparoscopic or open approach. The rate of pre-operative diagnosis remains low but with advances in imaging and awareness of this condition, this is likely to increase with time.

Keywords: Meckel's diverticulum; torsion; giant meckel's diverticulum; emergency surgery

Introduction

Torted Meckel's Diverticulum (MD) is a rare entity. We describe a case of MD torsion that was diagnosed pre-operatively and managed with laparoscopic resection. MD is the most common congenital anomaly of the gastrointestinal tract. It results from incomplete atrophy of the vitelline duct in the embryo and is classified as a true diverticulum containing all three layers of the intestinal wall [1, 2]. The prevalence of MD is ~0.3–2.9% in the general population with preponderance towards males [2]. The classical features of MD had long been taught as the 'rule of twos'. The rule states MD is located 2 feet proximal to the ileocecal valve (ICV), presents before 2 years of age, seen twice as commonly in men as women and is found in 2% of the population [3].

Case report

A 22-year-old male presented to the emergency department with a 12 hour history of right iliac fossa and suprapubic pain. He had no other presenting complaints including nausea, vomiting, or anorexia. He had no significant past medical or surgical history except for a similar presentation to the hospital 3 months prior with spontaneous improvement of his pain and was discharged home without further investigations. He had no listed regular

medications. On examination, he was afebrile with normal vital signs. He was tender to palpate over his right iliac fossa and suprapubic area with associated voluntary guarding. No signs of generalized peritonism could be elicited. He had raised white cell count of $15 \times 10^9/L$. His electrolytes, renal function, haemoglobin, and C-reactive protein (CRP) were normal.

Computed tomography (CT) of the abdomen and pelvis with portal venous phase contrast (see Fig. 1) demonstrated a gas and fluid filled blind structure in the right lower quadrant measuring 40 mm in diameter communicating with a small bowel loop anteriorly. There was a whorled appearance of its neck with subtle surrounding fat stranding suggestive for a tortured MD. The appendix appeared to be separate from the abnormality, lying superiorly and to its right with its tip adjacent to the right iliac vessels. Small volume of free fluid in the pelvis was identified without free air in the peritoneal cavity to suggest hollow viscus perforation.

The patient was commenced on isotonic intravenous fluids and broad-spectrum intravenous antibiotics. Diagnostic laparoscopy was done on the same day confirming a tortured MD with early gangrenous changes associated with a congenital band (see Figs 2 and 3). No evidence of perforation or purulence was identified during laparoscopy in the peritoneal cavity. A segmental

Received: November 16, 2023. Accepted: December 11, 2023

Published by Oxford University Press and JSCR Publishing Ltd. © The Author(s) 2024.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited.

For commercial re-use, please contact journals.permissions@oup.com



Figure 1. CT abdomen pelvis showing gas and fluid-filled structure in pelvis.

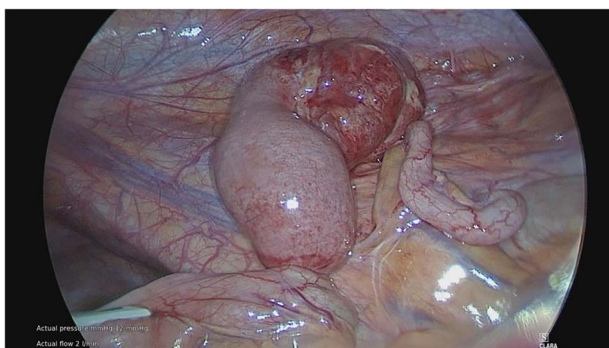


Figure 2. Torted MD with gangrenous distal portion. Adjacent appendix appears mildly injected.

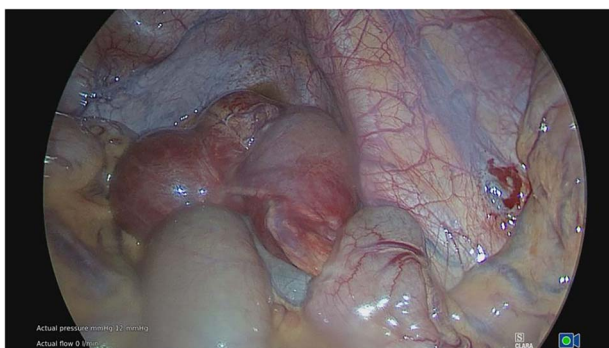


Figure 3. Congenital band associated with giant MD.

resection of the MD with primary stapled anastomosis of the small intestine was performed through a 5 cm Pfannenstiel incision. The appendix though mildly injected did not demonstrate features of appendicitis macroscopically. Given its proximity to the pathology, an appendicectomy was performed concurrently.

Histopathology of the specimens confirmed torsion of MD and a normal appendix. The MD had a 6 cm length and 4 cm width. The patient had an uneventful postoperative course and was discharged home on the 4th postoperative day. He was seen for follow-up in the outpatient clinic 2 weeks later and he remained well with no complications.

Discussion

A comprehensive literature review of all cases of MD torsion was conducted on the PubMed and EMBASE database using search

terms 'torsion' and 'Meckel's diverticulum' with the Boolean operator 'AND'. Additional articles were also found through searching reference lists and google scholar. Only 47 were found in the English language and the full text was available. Including our case, data were gathered for 48 patients with torsion of MD. Table 1 summarizes the findings gathered from all the case reports.

Among the 48 patients, there were 38 males and 10 females. The age ranged from 9 months to 68 years old with a median age of 24 years. There were 17 paediatric cases and 31 adult cases. The most common symptom at presentation was abdominal pain (98%), followed by vomiting (58%), fever (33%), distension (33%), obstipation (23%), and diarrhoea (10%). White cell count was raised in majority of patients ($42/47 = 89\%$). C-reactive protein was not frequently measured but when it was done, the result was abnormal ($12/15 = 80\%$).

The length of MD ranged from 5 cm to 25 cm (mean = 10.3 cm). This is longer than the reported mean of MD in general which is 3.05 cm [2]. Giant MD has been historically defined as MD longer than 5 cm and is theorized to be more prone to complications [4]. Of note, all the patients with torsion of MD had a length of at least 5 cm. The incidence of giant MD is unknown but there have been no instances of incidental finding of asymptomatic giant MD [5].

The width of MD ranged from 1 cm to 12 cm (mean = 3.6 cm). This is also longer than the reported mean of MD in general of 1.58 cm [2]. The distance from ICV ranged from 2 cm up to 130 cm (mean = 56.4 cm). This is slightly higher than the mean distance from ICV for MD in general which is 52.4 cm [2].

In most of the cases the MD was diagnosed intraoperatively (94%). Among these, there were 8 cases where imaging suggested a blind-ending fluid or gas filled structure, but diagnosis was not ultimately made before operation. A pre-operative diagnosis of MD was made in only three of the cases with CT (6.5%).

Surgical options for MD include diverticulectomy, wedge resection, and segmental resection via laparoscopic or open approach [6, 7]. Among patients with torsion of MD, the approach was more commonly done through laparotomy (63%) compared to laparoscopy (31%). This is likely due to the need for diagnosis in the deteriorating surgical patient with unknown diagnosis. The approach was unknown in some of the cases (6%). Of those that started with laparoscopy, most were converted to laparotomy (40%) and some laparoscopy assisted (13%). Among patients with torsion of MD, definitive surgical management was achieved with segmental resection (54%), diverticulectomy (25%) followed by wedge resection (8%). One case required ileocecal resection as the MD was only 2 cm from the IC valve. Appendicectomy was also done in 25% of patients.

Conclusion

We describe a rare case of torsion of MD in a young male patient which was managed with segmental resection without complications. A comprehensive literature review of all previous cases of torsion of MD showed that majority of patients presented with abdominal pain with a leucocytosis. Torsion occurs invariably with giant MD defined as a length of >5 cm. The rate of pre-operative diagnosis remains low but with advances in imaging and awareness of this condition, this would be expected to increase with time which would directly impact on its surgical approach and management.

Table 1. List of cases in English literature.

Case	Author	Year	Age (years)	Sex	Size (cm)	Distance from ICV (cm)	Approach	Operation
1	Our case	2023	22	M	6 × 4	75	Laparoscopy assisted	Segmental resection
2	Mashlah <i>et al.</i>	2023	0.75 (9 months)	M		120	Laparotomy	Segmental resection
3	Kafshgari <i>et al.</i>	2023	5	F			Laparotomy	Segmental resection
4	Munasinghe <i>et al.</i>	2022	20	M	25 × 2	45	Laparotomy	Segmental resection
5	Maree <i>et al.</i>	2022	2.5	M			Laparotomy	Wedge resection
6	Goh <i>et al.</i>	2022	38	M		50	Laparoscopy → laparotomy	Segmental resection
7	Bejiga and Ahmed	2022	20	M	8	60	Laparotomy	Segmental resection
8	Onyemkpa <i>et al.</i>	2021	49	M			Laparoscopy	Diverticulectomy
9	Jha <i>et al.</i>	2021	13	F	10 × 2	30	Laparotomy	Segmental resection
10	Chen <i>et al.</i>	2021	20	M	12	80	Laparotomy	Diverticulectomy
11	Ahmed <i>et al.</i>	2021	28	F			Laparoscopy	Diverticulectomy
12	Ajmal <i>et al.</i>	2020	25	M	12	50	Laparotomy	Segmental resection
13	Nagata <i>et al.</i>	2019	31	F	11 × 8 × 5	2	Laparotomy	Ileocaecal resection
14	Hung <i>et al.</i>	2019	48	M	10	40	Laparotomy	Segmental resection
15	Yagnik	2018	14	M			Laparotomy	Segmental resection
16	Tiong <i>et al.</i>	2018	44	M	10 × 2		Laparotomy	Segmental resection
17	Botezatu <i>et al.</i>	2018	30	F	5 × 1	55	Laparotomy	Diverticulectomy
18	Parab <i>et al.</i>	2017	11	F	15		Laparoscopy → laparotomy	Segmental resection
19	Morao <i>et al.</i>	2017	14	M	12 × 7	50	Laparotomy	Segmental resection
20	Kohga <i>et al.</i>	2017	49	M	8 × 7.5	130	Laparoscopy assisted	Segmental resection
21	Yildiz <i>et al.</i>	2016	21	F	12 × 3	45	Laparoscopy → Laparotomy	Diverticulectomy
22	Rosenbaum and Pollock	2016	5	M		12	Laparotomy	
23	Luu <i>et al.</i>	2016	34	M	17	40	Laparotomy, segmental resection	Segmental resection
24	Kirmizi <i>et al.</i>	2016	23	F	8 × 3	60	Laparotomy	Segmental resection
25	Ahmed <i>et al.</i>	2016	4	M	5 × 2	40	Laparoscopy	Segmental resection
26	Tenreiro <i>et al.</i>	2015	18	M	10 × 2	50	Laparotomy	Segmental resection
27	Seshadri <i>et al.</i>	2015	65	M	8	60	Laparoscopy → laparotomy	Diverticulectomy
28	Rencuzogullari <i>et al.</i>	2015	37	M		60	laparotomy	Segmental resection
29	Ren <i>et al.</i>	2015	32	M	12 × 5 × 4	90	Laparotomy	Segmental resection
30	Hadeed <i>et al.</i>	2015	29	F		30	Laparoscopy	Diverticulectomy
31	Murruste <i>et al.</i>	2014	41	M	14 × 12	50	Laparotomy	Segmental resection
32	Tassinari <i>et al.</i>	2013	1	M	6 × 3	50	Laparoscopy	Wedge resection
33	Sasikumar <i>et al.</i>	2013	26	M	6 × 3		Laparotomy	Segmental resection
34	Nose <i>et al.</i>	2013	11	M	6 × 2	70	Laparoscopy	Wedge resection
35	Seth <i>et al.</i>	2011	68	M			Laparoscopy → Laparotomy	Segmental resection
36	Halliday <i>et al.</i>	2011	62	F	6.5		Laparoscopy → Laparotomy	Segmental resection
37	Cartanese <i>et al.</i>	2011	42	M	11 × 1.5	50	Laparotomy	Diverticulectomy
38	Nunes <i>et al.</i>	2009	47	M	14 × 3	80	Laparotomy	Segmental resection
39	Kiyak <i>et al.</i>	2009	42	M	7.5 × 1.5	80	Laparotomy	Diverticulectomy
40	Prasad <i>et al.</i>	2006	13	M			Laparoscopy	Diverticulectomy
41	Limas <i>et al.</i>	2006	6	M	16 × 4 × 4	50	Laparotomy	Diverticulectomy
42	Tan and Zheng	2005	51	M	10 × 3	60	Laparotomy	Segmental resection
43	Farris and Fernbach	2001	14	M			Laparotomy	Resection
44	Malhotra <i>et al.</i>	1998	54	M			Laparotomy	Segmental resection
45	Gallego-Herrero <i>et al.</i>	1998	2	M	5.8 × 3	20	Not specified	
46	Moore and Burkle	1988	3.5	M	8 × 2.5	60.9	Not specified	
47	Webster	1966	41	M			Laparotomy	Diverticulectomy
48	NEJM	1952	2.5	M	8	90		Wedge resection

ICV: ileocaecal valve; M: male; F: female.

Conflict of interest statement

No conflict of interests to declare.

Funding

None declared.

References

1. Munasinghe BM, Dhanuksha DC, Samarathunga RD, *et al.* Acute abdomen following axial torsion of a Giant Meckel's diverticulum in a young male: a case report. *Int J Surg Case Rep* 2022;**99**:107631. <https://doi.org/10.1016/j.ijscr.2022.107631>.

2. Hansen CC, Soreide K. Systematic review of epidemiology, presentation, and management of Meckel's diverticulum in the 21st century. *Medicine (Baltimore)* 2018;**97**:e12154. <https://doi.org/10.1097/MD.00000000000012154>.
3. Uppal K, Tubbs RS, Matusz P, et al. Meckel's diverticulum: a review. *Clin Anat* 2011;**24**:416–22. <https://doi.org/10.1002/ca.21094>.
4. Tan YM, Zheng ZX. Recurrent torsion of a giant Meckel's diverticulum. *Dig Dis Sci* 2005;**50**:1285–7. <https://doi.org/10.1007/s10620-005-2774-7>.
5. Malcolm RJ, Iglesias IM, Smith-Singares E. Perforated Giant Meckel diverticulitis in an elderly patient: case report and review of the literature. *Int J Surg Case Rep* 2018;**43**:45–8. <https://doi.org/10.1016/j.ijscr.2018.01.023>.
6. Blouhos K, Boulas KA, Tsalis K, et al. Meckel's diverticulum in adults: surgical concerns. *Front Surg* 2018;**5**:55. <https://doi.org/10.3389/fsurg.2018.00055>.
7. Bejiga G, Ahmed Z. Gangrenous Meckel's diverticulum with small bowel obstruction mimicking complicated appendicitis: Case report. *Int J Surg Case Rep* 2022;**97**:107419. <https://doi.org/10.1016/j.ijscr.2022.107419>.