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Laparoscopic Approach in Correction of Adult Diaphragmatic Morgagni Hernia

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Abstract

Introduction. Adult diaphragmatic hernia of Morgagni is a very rare congenital anomaly. Therefore, to date there is no standard surgical techniques used in the management. Thus, a systematic review aimed to find the highest evidence in the management.

Method. A systematic review conducted in accordance with PRISMA. Literature search proceeded on PubMed and ScienceDirect using keywords "diaphragmatic hernia of Morgagni in adult", and "treatment". These articles were reviewed and appraised for the study design used, enrolled samples, validation of results, etc. to find out the level of evidence. The analysis was focused on length of stay, the recurrence, and complications.

Results. There were 15 articles reviewed. The transabdominal approach provides better exposure, short length of stays, and low complications. Laparoscopic has been used widely and replaces open surgery. The defect closure using mesh is indicated in large defect of ≥ 20 cm². The hernial sac is unnecessary to resect, with no complication such as seroma or recurrence.

Conclusion. A laparoscopic approach referred to the method of choice in the management of adult diaphragmatic hernia of Morgagni. Unnecessary resection of hernial sac and tension free defect closure should be of one consideration.

Keywords: *Adult diaphragmatic hernia of Morgagni, management*

Introduction

Adult diaphragmatic hernia of Morgagni is a very rare congenital anomaly that undiagnosed at the early life as there's no symptom and sign requiring urgent treatment. The incidence rate is quite low as 0.17-3%,¹⁻³ therefore no standard techniques of surgical correction were used for the management. To date, surgical the procedure referred to several variations of surgical techniques, from the approach of choice, the technique to close the defect (the use of mesh or primary sutures), the management of hernial sac (sac removal or preserved), and other variations.⁴⁻⁶

Since 1992 the open surgical technique has been abandoned in the management and replaced by minimal invasive surgery as the minimal invasive method has been proven to be safe and provide a better outcome in the hands of experienced surgeons.² A systematic review purposed to find out the highest evidence in the management in setting up an operational procedure.

Method

A study of systematic review conducted in accordance with preferred reporting items for systematic review and meta-analysis protocols (PRISMA). Literature search proceeded on some online database sites, i.e. PubMed and ScienceDirect using keywords "diaphragmatic hernia Morgagni in adult", and "treatment". All articles focused on hernia of Morgagni in adult over the past ten years published in English or Bahasa were includes in this study. While as studies focused on pediatric, those of correspondence, or did not includes the outcome of the management, and full text unavailable, were excluded from the study. Selection has been made based on clinical question,

and these articles were reviewed and appraised for the study design used, enrolled samples, validation of results, etc. to find out the level of evidence. The analysis was focused on length of stay, the recurrence, and complications.

Results

On literature search, a total of 537 articles found i.e. 215 articles from PubMed and 322 articles from ScienceDirect. After screening up, a total of 15 articles enrolled, including an article of article reviews, a case control, three descriptive studies, three case series, and seven case reports. Critical analysis and data extraction was carried out, focused on the surgical approach, defect closure technique, management of the sac, the outcome consist of length of hospital stay, recurrence, and complication. These articles were listed in the table 1 including the level of evidence.

Discussion

There are options of surgical approach in the management of adult diaphragmatic hernia of Morgagni, namely transabdominal approach (either open laparotomy or per laparoscopic approach) and trans-thoracic approach (through open thoracotomy or per thoracoscopy approach). On a case-control study, Saleh et al compared the transabdominal- to trans-thoracic approach in the evaluation of the accessibility, duration of surgery, length of postoperative hospital stays, and the recurrence. The authors concluded that exposure to surgical field is clearer and better (targeted) through transabdominal approach. Surgeon may have an access the entire diaphragm and exploration of intraabdominal disorder(s) in a time.

Table 1. Studies on the approaches in adult diaphragmatic hernia

Year/Author	Study Design	Surgical Approach		Defect Closure	Length of stays (day)	Recurrence % (n)	Complication % (n)	Level of evidence*
		Laparotomy/Laparoscopy/Thoracotomy/Thoracoscopy	Sac Resection % (n)					
Horton (2008) ⁷	Review	Laparotomy/Laparoscopy/Thoracotomy/Thoracoscopy	LAR: 82 (32/39) TOR:100 (63/63) LO: 31 (13/42) TO: 100 (1/1)	Primary suture, Mesh	LAR: 11 TOR: 8 LO: 3 TO: 14	LAR: 0 TOR: 1(1/129) LO: 0 TO: 0	LAR: 17 (9/53) TOR: 6 (6/94) LO: 5 (2/44) TO: 0 (0/2)	3
Saleh (2017) ⁸	Case control	Laparotomy/Thoracotomy	N/A	Primary suture	TOR: 2 LAR: 2	TOR: 5,6 (1/9) LAR: 0	TOR: none LAR: 5.6(1/9)	3
Aghajanzadeh (2012) ⁹	Cross sectional	Laparotomy/Thoracotomy	LAR: 0(0/26) TOR: 0(0/6)	Primary suture	N/A	None	TOR: 0.33 (2/6) LAR: 0.03 (1/26)	3
Karamustafaoglu (2010) ¹⁰	Cross sectional	Laparotomy	100 (13/13)	Primary suture	8 (6-14)	None	None	3
Simali (2005) ¹¹	Cross sectional	Thoracotomy	100 (24/24)	Primary suture	6.3 (5-8)	None	None	3
Park (2014) ¹²	Case series	Laparoscopy	100 (13/13)	Primary suture	1-4	None	None	4
Terrosu (2012) ¹³	Case series	Laparoscopy	N/A	Primary suture	2-4	None	None	4
Abraham (2011) ¹⁴	Case series	Laparotomy/Thoracotomy	100(20/20)	Primary suture, Mesh, both	N/A	None	LAR: 0.05 (1/20) TOR: 0.05 (1/20)	4
Sahsamanis (2017) ¹⁵	Case report	Laparoscopy	100 (1/1)	Mesh	4	None	None	4
Yamamoto (2016) ¹⁶	Case report	Laparoscopy	None	Primary suture	8	None	None	4
Kashiwagi (2014) ¹⁷	Case report	Laparoscopy	100 (1/1)	Mesh	8	None	None	4
Pousius (2012) ¹⁸	Case report	Thoracotomy	100 (1/1)	Mesh	6	None	None	4
Yamaguchi (2012) ¹⁹	Case report	Laparoscopy	N/A	Mesh	1	None	None	4
Arora (2008) ²⁰	Case report	Laparoscopy	None	Primary suture	N/A	None	None	4
Papanikolaou (2008) ²¹	Case report	Laparotomy	100 (1/1)	Primary suture	5	None	None	4

*levels of evidenced according to Center of Evidence Based Medicine University of Oxford 2011, N/A: no data available; TOR: thoracotomy; LAR: laparotomy; LO: laparoscopy; TO: thoracoscopy

Reduction of sac contents is easier by pulling the content to the abdomen where it belongs rather than pushing the contents from thoracic side.⁸ Another indication of transabdominal approaches is should there is a complication of strangulated hernia leading to intestinal necrosis as well as bilateral diaphragmatic hernia.^{10,20,21} The duration of surgery is shorter of 85 ± 20.92 minutes in transabdominal versus 99.4 ± 13.3 minutes in trans-thoracic approach.⁸ Length of stays in both of approaches is two days.⁸ The outcome of both approaches is more less equal. In transabdominal approach there is no recurrence noted in one year follow-up, whereas in trans-thoracic a recurrence of a case (5.6%) has been reported.⁸ Incisional hernia as postoperative complications of a female with obesity in transabdominal approach (5.6%) has been reported.⁸

The controversy regarding hernial sac resection or not and defect closure were the focus on study of Aghajanzadeh et al who concluded unnecessary resection of hernia sac. A total of 36 subjects with Morgagni hernia underwent no sac resection showed no seroma or recurrent hernia as the complication.⁹ The closure of hernia defect using mesh is not necessary; primary sutures using nonabsorbable suture of 1.0 shows no recurrence. Amongst complications, atelectasis has been reported in two cases (0.05%) and an incisional hernia in one case (0.02%).⁹ The most important thing in closing the defect is no tension. Garriboli et al reported the recurrence of 42% in Morgagni hernia with primary closure due to tension.²³ A study of Park et al. and Nasr et al. concluded that decision to close the defect should be made based on consideration of defect size.^{12,24} Should the defect measuring of 20-30 cm² a prosthesis mesh is the best option,^{10,12,13,24} should the defect less than 20 cm² then primary sutures is safe and easy. Primary sutures is preferred method as the use of mesh increases the risk of injury to the intrathoracic and upper abdominal organs, adhesions, and infections.^{10,12}

A review of Nasr et al reported that hernia sac were absorbed spontaneously in a one-month follow-up using CT scan.²⁴ It was concluded that hernia sac resection should not routinely carried out, the only indication is when the size is not too large and proven to be minimal risk of injury to intrathoracic organs.⁷ In other article, however, it is recommended to keep a complete resection of hernial sac to prevent seroma formation and otherwise the remaining sac may be a leading point of recurrence. The only difficulty in sac resection was on the anterior side adjacent to the pericardium and the organ within, and it can be avoided by choosing a trans-thoracic approach.^{15,17,19}

Conclusion

A laparoscopic approach referred to the method of choice in the management of adult diaphragmatic hernia of Morgagni. Unnecessary resection of hernial sac and tension free defect closure should be of one consideration.

Conflict of interest

Author disclose there was no conflict of interest.

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