

Management of Incidentally Found Meckel's Diverticulum A New Approach : Resection Based on a Risk Score

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Abstract. The management of incidentally found Meckel's diverticulum (MD) remains unclear. The risk for future complications of a non-resected MD must be weighed against the risk of complications for a resected MD in order to justify a prophylactic resection. Morbidity-rates after resection of incidentally found MD are much lower than those after resection of symptomatic MD. Several risk factors which increase the risk for future complications of an asymptomatic MD have been described in the literature.

We suggest that an asymptomatic MD should be removed in cases where there is a higher risk of it becoming symptomatic in the future, on condition that the resection can be done with presumed low morbidity. Based on the literature data we propose a scoring system in order to base the decision for surgery on more objective grounds and weighted criteria. This Risk Score is based on 4 risk factors : male sex, patients younger than 45 years, diverticula longer than 2 cm and the presence of a fibrous band. We suggest resection of an asymptomatic MD with a Risk Score of ≥ 6 points.

A transverse diverticulectomy is preferable in most cases. In short, broad based MD, or in the case of a palpable mass at the base, a wedge-shaped excision is the best alternative.

Meckel's diverticulum (MD) is the most common congenital abnormality of the gastro-intestinal tract, with an incidence of 1-3% (1, 2).

It is obvious that symptomatic MD should be removed ; but should an incidentally found MD be resected ? In order to answer this question, the risk for future complications of a non-resected MD must be weighed against the risk of complications for a resected MD.

The management of incidentally found MD is still controversial. Some advise to leave an incidentally encountered MD untouched, others advocate resection only in the presence of risk factors and some recommend resection in all cases.

Risk of future complications and risk factors

Several risk factors which increase the risk of future complications of an asymptomatic MD have been described in the literature. The most common risk factors described are : male sex, young age, length of the diverticulum, presence of a fibrous band and the presence of ectopic tissue in the diverticulum.

Although the incidence of MD is equal in both sexes, complications are more frequent in men than in women, with a male-female ratio of about 3:1 (3-7).

Young age is also described as a risk factor. Mackey (5) published a large retrospective study with a

total of 402 patients with a diagnosed MD over a period of fifty years. Of all complications, 70.1% occurred in patients younger than 40 years of age. According to LUDTKE (1), most diverticular complications were seen in children younger than 2 years of age. LEIJONMARCK (8) found a lifetime risk of complications from MD of 3.7% at 16 years, 2% at 30 years and almost zero when older. The more recently published Mayo Clinic experience with 1476 patients of PARK (6) found significantly more symptomatic MD in patients younger than 50 years of age. In contrast to these figures CULLEN (9) reported a lifetime risk of 6.4% for all ages. These data show some discrepancy, but according to the two largest studies (5, 6) patients younger than 40 or 50 years of age seem to be more at risk.

The length of the diverticulum is also an important factor for developing complications. MACKEY (5) and PARK (6) found a significant increase of symptomatic MD in diverticula longer than 2 cm. LEIJONMARCK (8) also observed more symptomatic diverticula when longer, but the cut-off was 4 cm. The difference in length may be explained by the fact that diverticula grow with age, and Leijonmarck only included patients older than 15 years of age.

It is obvious that fibrous bands predispose to the development of intestinal obstruction (3, 5, 7).

There is a distinct correlation between complications like ulceration and bleeding and the presence of ectopic

tissue in the diverticulum. Reports show ectopic tissue in 32.5-72% of the MD. Most (60-100%) harbour ectopic acid-producing gastric glands (2, 7, 10, 11). In bleeding MD, ectopic tissue is found in up to 96% of all cases (2, 7, 8).

Decision on resection and morbidity of resection

LEIJONMARCK (8) concluded that all diverticula should be left untouched when incidentally encountered during laparotomy in patients of 16 years of age and older, because the lifetime risk for complication from MD was calculated to be low and decreasing with age. Moreover, a revision was noted after resection of 6% in the asymptomatic group because of intestinal obstruction or leakage.

Because of the significant morbidity with complication-rates of 8.5-16% associated with the resection of symptomatic MD, some authors (5-7, 12) advise resection of an asymptomatic MD in the following conditions which increase the risk for future complications: male patient (5, 6, 12), patients younger than 40 or 50 years (5, 6, 12), diverticula longer than 2 cm (5, 6, 12), presence of ectopic tissue in the diverticular sac (5-7, 12), presence of a fibrous band (7, 12).

Others tend to encourage prophylactic removal of all asymptomatic MD when incidentally encountered, because the morbidity after resection of asymptomatic MD compared to the morbidity after resection of symptomatic MD was very low, respectively 0-6% versus 7-12% (1, 3, 4, 9).

These data are not all very recent and surgical morbidity has been dramatically decreased over the past twenty years. In the era of minimally invasive surgery and with the introduction of mechanical stapling devices, the morbidity of resection of an asymptomatic MD appears nowadays much lower and less severe.

Management of asymptomatic MD

Due to these different opinions it remains unclear if or when an asymptomatic MD should be resected. An asymptomatic MD is only a threat to the patient if it becomes symptomatic and therefore we suggest it should only be removed in cases where there is a higher risk of it becoming symptomatic in the future and a resection can be done with presumed low morbidity without contra-indications like diffuse peritonitis.

Based on the literature data on the incidence and importance of the individual risk factor, we propose a scoring system in order to base the decision for surgery on more objective grounds and weighted criteria. This "Risk Score" is based on 4 risk factors: male sex, patients younger than 45 years of age, diverticula longer than 2 cm and the presence of a fibrous band. Although

Table I

Calculating the Risk Score according to the presence or absence of risk factors

Risk factor		points
Sex	male	3
	female	1
Age	< 45 years	2
	≥ 45 years	1
Length of MD	> 2 cm	2
	≤ 2 cm	1
Presence of fibrous band	yes	3
	no	0
Risk Score		Total points

the histological presence of ectopic tissue is a well known risk factor, we did not add it to this list. The histological presence of ectopic tissue is very difficult to determine intra-operatively without opening the bowel, because the palpation of a mass is found to be unreliable (11, 12). Moreover, palpation does not always predict the presence of ectopic tissue (6, 11) and is even more problematic during a laparoscopic procedure.

A Risk Score is then calculated by awarding points to each risk factor according to its presence or absence with a maximum of 10 points when all risk factors are present (Table I). We suggest resection of an asymptomatic MD with a Risk Score of 6 points or more.

In the era of minimally invasive surgery (13-16), a stapled transverse diverticulectomy is preferable in most cases because of the potentially increased operation time or morbidity (e.g. wound infection) after laparoscopic assisted, or classic, intestinal resection (17). A stapled transverse diverticulectomy may be difficult, especially when the MD is short and broad based. The use of an HDR (height-to-diameter ratio) has been reported to determine the choice of resection technique (11, 18). In MD with an HDR as little as 1.6 or 2.0, ectopic tissue was found in all areas of the diverticulum, from base to tip, and diverticulectomy would be insufficient if not all the ectopic tissue is resected. Therefore, in these short broad based MDs or in cases of a palpable mass at the base we suggest a wedge-shaped excision of the MD. With this technique a complete resection of the diverticulum can be done, which has the advantage of a direct view on the bowel mucosa, thus helping the surgeon to evaluate the margin of excision.

The discussion of the management of incidentally found MD can also be compared with incidental appendectomy. The lifetime risk of acute appendicitis is 6.7-8.6% (19). Incidental appendectomy is not generally accepted, although the lifetime risk for acute appendicitis is probably comparable to the lifetime risk of a complication from an MD: though one should also take into

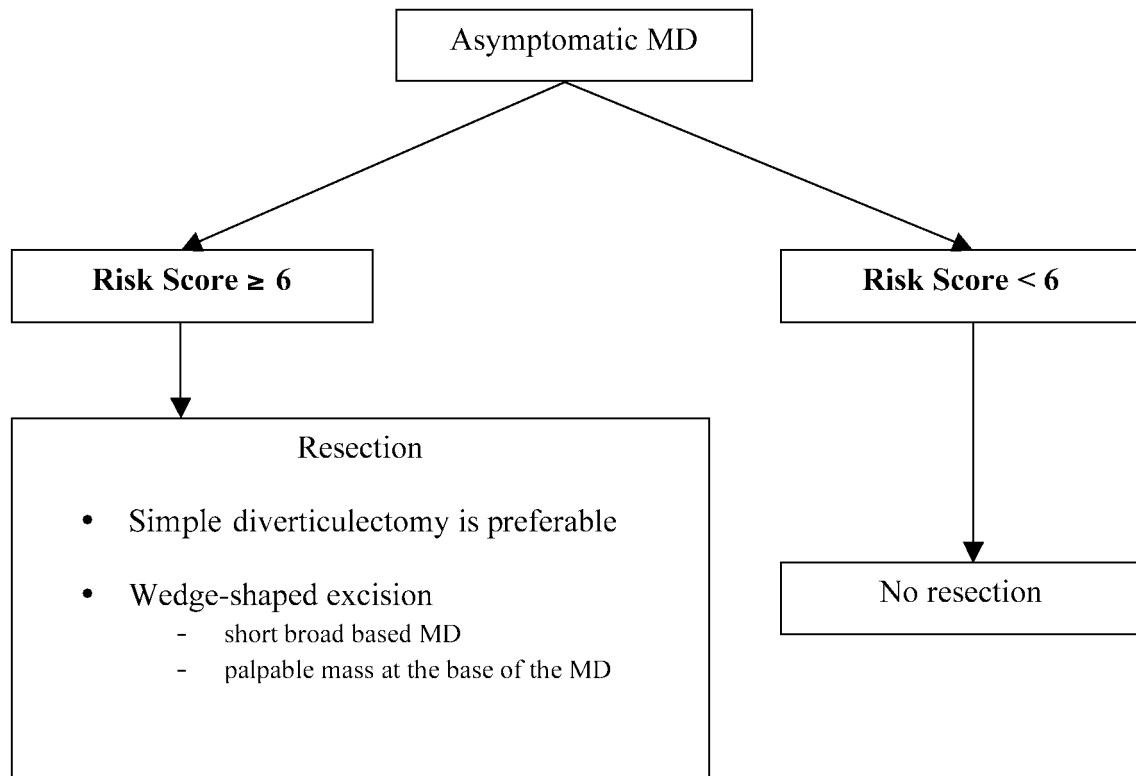


Fig. 1

Flow chart for management of asymptomatic MD based on the Risk Score

account that a complicated MD is associated with a higher morbidity than acute appendicitis (5, 9, 20).

In conclusion we suggest that an asymptomatic MD should be removed in cases where there is a higher risk of it becoming symptomatic in the future, on condition that the resection can be done with presumed low morbidity. We propose a scoring system in order to base the decision for surgery on more objective grounds and weighted criteria. We advise resection of an asymptomatic MD with a Risk Score of 6 points or more. This Risk Score should now be validated in future prospective registries.

A stapled transverse diverticulectomy is the preferable choice of treatment. In a short broad based MD, or in cases where there is a palpable mass at the base, a wedge-shaped excision is the best alternative (Fig. 1).

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