

MECKEL'S DIVERTICULUM: THE INCIDENCE, GROSS AND MICROSCOPIC FEATURES; A CADAVERIC STUDY

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ABSTRACT

Background: Meckel's diverticulum is the most common congenital anomaly of the gastrointestinal tract due to persistence of omphalomesenteric duct and it can present diagnostic and surgical challenges. The aim of this study is to find out the incidence of Meckel's diverticulum among the cadavers of Indian origin and to observe its gross and microscopic features.



Materials and Methods: The study was carried out on 45 Indian cadavers (38 males & 7 females) in the Department of Anatomy, JNIMS, Imphal, from 2010-2017. The incidence of Meckel's diverticulum was determined and its gross and histological features were observed.

Results: Meckel's diverticulum was observed in 2.22% of the cases. It was 4 cm in length, 2cm in breadth and its tip was free without any connection with the umbilicus. Histologically, the tissue showed features similar to ileum.

Conclusion: An adequate knowledge of embryological, pathological, radiological and clinical characteristics of Meckel's diverticulum and so also of its incidence in a particular population is essential for the early and accurate diagnosis and effective surgical management of complicated cases.

KEY WORDS: Meckel's diverticulum, congenital anomaly, omphalomesenteric duct, ileocaecal valve.

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INTRODUCTION

Meckel's diverticulum is the most common congenital malformation of the gastrointestinal tract (occurs in upto 2% of the population) due to failure of the omphalomesenteric duct to close properly, and can present diagnostic and surgical challenges [1]. Several characteristics that

facilitate identification of a Meckel's diverticulum include its location two feet proximal to the ileocecal valve, the presence of an independent vessel supplying the structure, five layers of small intestine and ectopic mucosa of either gastric, pancreatic or another origin other than small intestine in a majority of specimens [2].

It is usually asymptomatic, arbitrary discovered during some surgical interventions for other diseases, but it may give rise to a series of complications: gastrointestinal bleedings, invaginations and obstruction, perforation, strangulation, hernia and more rarely, malignant degeneration [3,4]. While most Meckel's diverticula present in childhood, adult patients are also at risk for complications, though these tend to decrease with increasing age [5].

The risk of developing digestive complications with a clinical manifestation is estimated at about 4.8% of the patients, but this risk is being reduced with age [5,6]. Its clinical symptomatology is non-specific and, because of this reason, the diagnosis is difficult to establish. It is suspected when the occlusive, inflammatory symptomatology or a gastrointestinal bleeding appears in young male patients [7,8]. Due to the rarity of cases in adults, it is still misdiagnosed preoperatively, although with the wide spread use of technetium-99m pertechnate scan and diagnostic laparoscopic approach, the rates of preoperative diagnosis have improved [9]. Considering its diagnostic difficulties and diverse clinical presentations, the present study was undertaken with the aim to find out the incidence of Meckel's diverticulum among the cadavers of Indian origin and to observe its gross and microscopic features which will contribute to better diagnosis and management of this case.

MATERIALS AND METHODS

The study was carried out on 45 Indian cadavers (38 males & 7 females) in the Department of Anatomy, JNIMS, Imphal from 2010-2017. The incidence of Meckel's diverticulum was determined. Gross observation was carried out and histological study of a portion of the tissue was done using routine Haematoxylin-Eosin stain.

RESULTS

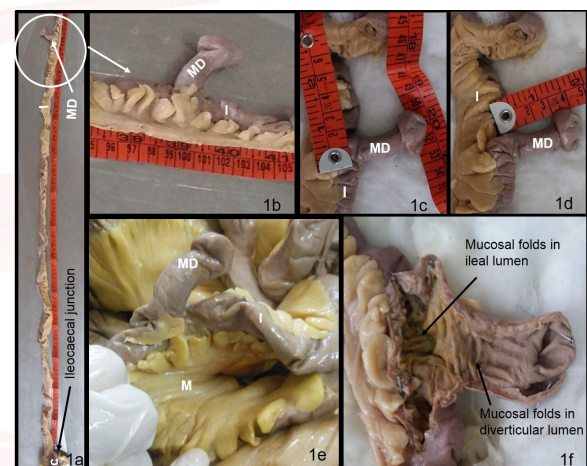
Incidence: The incidence of Meckel's diverticulum was determined to be 2.22% (2.63% among the males and 0% among the females).

Gross observations: Meckel's diverticulum was located about 99 cm proximal to ileocaecal junction on the ante-mesenteric border of ileum. It was 4 cm in length, 2cm in breadth. Its tip was

free without any connection with the umbilicus or other portions of the intestine (Fig 1e). The lumen showed mucous folds, which were similar to that of the adjacent part of the ileum. It was found to be healthy without any sign of inflammation or any scar (Fig 1).

Histological observations: The tissue showed features like the adjacent ileum having the following 4 layers in its wall: mucosa lined by simple columnar epithelium, with villi and intestinal glands, submucosa, muscularis externa with an inner circular and an outer longitudinal smooth muscle layers and serosa. There were no ectopic tissues like gastric, pancreatic or any other tissues (Fig 2).

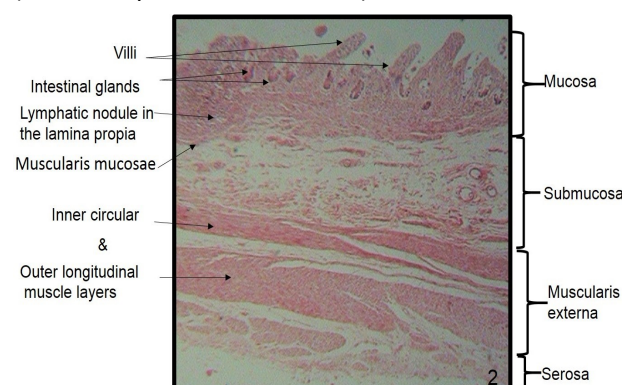
Fig. 1: Photographs showing the gross features of Meckel's diverticulum.



MD: Meckel's diverticulum, I: Ileum, C: Caecum, M: Mesentery of small intestine

1a: shows the location of MD from Ileocaecal junction, 1b: shows MD is located 99 cm from ileocaecal junction, 1c: shows breadth of MD is 2cm, 1d: shows length of MD is 4cm, 1e: shows MD is located on ante-mesenteric border of Ileum(I), 1f: shows mucosal folds in lumen of MD.

Fig. 2: Microphotograph of Meckel's diverticulum (Haematoxylin/Eosin stain: x10).



DISCUSSION

Meckel's diverticulum is the most common congenital anomaly of gastrointestinal tract which is the remnant of embryonic vitello-intestinal duct that usually disappears at seventh week of gestational life. The incidence of Meckel's diverticulum in the general population has been estimated to be about 2% [10]. which is correlating with the finding of 2.22% in the present study. However, reports from autopsy and retrospective studies showed a range from 0.14-4.5% [11,12]. There are contrasting reports regarding the gender ratio of Meckel's diverticulum in the previous studies. Some authors support the idea that there is a higher frequency among males, by a 4:1 ratio [13]. But some other authors argue that this is a malformation occurring in both sexes at the same rate [14] being more symptomatic in male patients [8]. Similarly, some other authors opined that although it occurs in both sexes, it may cause complications more frequently in males, and therefore is often diagnosed in males [15-17]. However, in the present study, it was observed exclusively in male.

Ninety per cent of diverticula are within 90 cm of distance from the ileocaecal valve, although diverticula upto 180 cm from ileocaecal valve have been observed [18]. The present study thus belongs to the rare 10% of the cases as the diverticulum was located at 99cm from the ileocaecal valve.

The present study conforms to the observation that Meckel's diverticulum is lined mainly by the typical ileal mucosa as in the adjacent small bowel. However, ectopic gastric duodenal, colonic, pancreatic, Brunner's glands, hepatobiliary tissue and endometrial mucosa may be found, usually near the tip [19] but, no ectopic tissue was observed in the present study.

A person with Meckel's diverticulum has 4-6% lifetime risk of developing a complication [18]. Its occurrence in males and females is equal, but incidence of complications is three to four times greater in males [20]. The risk of the complications decreases with increasing age, with no predictive factors for the development of complications [21, 22]. In the present study, the tissue was healthy without any sign of

inflammation or scar indicating that no complications ever developed.

The preoperative diagnosis of Meckel's diverticulum is still an outstanding challenge and there are cases that are misdiagnosed or not diagnosed preoperatively [9]. In doubtful cases, laparoscopy is a preferred diagnostic modality [23]. However, technetium-99m pertechnetate scan is the most common and accurate non-invasive investigation performed for these cases. When Meckel's scan is non-diagnostic or in patients with non-bleeding presentations, ultrasonography is perhaps the most useful non-invasive method of reaching a diagnosis [24].

CONCLUSION

Nonspecific symptomatology with overlapping clinical and imaging features of Meckel's diverticulum with other inflammatory and acute surgical conditions of the abdomen often present preoperative diagnostic challenges of the complicated Meckel's diverticulum cases. In the suspected cases, it should be looked for beyond the usual 2 feet distance from the ileocaecal valve as it may be found upto 180 cm, like in the present study where it was found at 99cm. Therefore, an adequate knowledge of embryological, pathological, radiological and clinical characteristics of Meckel's diverticulum and so also of its incidence in a particular population is essential for the early and accurate diagnosis and for effective surgical management of complicated cases.

Conflicts of Interests: None

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