

Native Umbilical Defect for Laparoscopic Entry in Adults, Prevalence and Related Factors

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Abstract

Background: The presence of native umbilical defects in adults and their use as laparoscopic first entry site is poorly documented. It would be a likely safer method than the Veress needle and the direct trocar insertion. This work aimed at reporting its prevalence, size and its relationship to gender, age and body mass index. **Methods:** In 160 consecutive laparoscopic operations a trans-umbilical incision was done and a defect at its base was looked for. When found it was measured and used as the first port entry site. Relationships of a native defect presence and their sizes to gender, age and BMI were analyzed. **Results:** The prevalence of a native defect in this series was 90%. Its presence had no relation to either gender, age nor BMI. Its size, however positively correlated with both age and BMI. There were no complications related to its use for first laparoscopic entry.

Conclusion: A native umbilical defect is present in 90% of adults. Whenever present, it is recommended for use as the first port entry site by an open technique. This method is simple, safe and avoids unnecessarily inducing another defect.

Keywords: Laparoscopy, Open technique, Access, Native defect, Umbilical defect

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Introduction

At birth there exists a defect in the linea alba at the depth of the umbilicus. This is the passageway of umbilical vessels that connect the fetus with his placenta. The classic and long-held view is that this defect usually closes spontaneously within a week, but may take longer, up to two years, hence the dictum of not correcting an umbilical hernia before the age of two. (1,2). This view was challenged by the finding of umbilical fascial defect in 25% of dissected adult cadavers (3). It was further confronted by consistently finding, even a small umbilical defect in all 94 pediatric patients whose ages ranged from 0.25 to 18 years with a mean of 10 years, and by its practical use for laparoscopic entry (4). Furthermore, the same technique was later reported in 963 adult patients from Mexico, where it was found in 100% of cases provided, they did not have previous umbilical area surgery (5). While the use of Veress needle and direct trocar entry require applying some degree of force in order to penetrate through the tough linea alba, open laparoscopy by Hasson's technique, at least theoretically, reduces entry

injuries. Furthermore, making use of an already present defect avoids unnecessarily adding another. Though the latter promises more safety and speed, it has been scarcely and inadequately mentioned in the medical literature, to the extent that it did not get a mention in a 2019 Cochrane systematic review about laparoscopic entry techniques (6). The purpose of this work was to study the prevalence of a native umbilical defect in adults, its size, and the relations of its existence and size with age, gender and body mass index (BMI). Another aim is to document its use as a laparoscopic first entry site.

Patients and Methods

This is a case series study that was conducted on 160 consecutive adult patients who had laparoscopic operations at general surgery department of Cairo University Hospitals during the period from May to August 2017. The study protocol was approved by the Research Ethics Committee. Those who had clinically evident umbilical hernias and those with previous surgery

at this region were excluded. Preoperative data, including age, gender and BMI were obtained.

Operation

Under general anesthesia, a vertical trans-umbilical incision was performed. The two lips of incision were dissected away, revealing the linea alba where a defect, at the bottom of the umbilical scar, is looked for. In some cases, the defect was identified by protrusion of a small piece of extraperitoneal fat that was easily distinguished visually from subcutaneous fat. As the flimsy peritoneum was reached, it was caught up with fine clamps and snipped open with scissors. The defect's diameter was then calibrated with the tips of Kelly forceps (Figure 1).



Figure 1. The tip of Kelly forceps was used to calibrate the maximum dimension of the defect.

Whenever needed the defect was then enlarged by dividing its upper and/or lower edges so as to accommodate the first trocar. By the end of the procedure the defect edges were approximated with 0 polydioxanone suture.

Postoperative period

Patients were observed after the operation for possible complications that might have arisen as a result of the laparoscopic entry, as bleeding, intestinal injury and surgical site infection. They were followed for at least six months for possible development of an incisional hernia.

Statistical analysis

The statistical package for social science (SPSS version 24) was utilized for data analysis. Simple descriptive statistics (arithmetic mean and standard deviation) were applied for summary of normal quantitative data, while frequencies were used for qualitative data. Chi square test was applied for relation between gender and the presence of a defect. After exclusion of those with no detectable defect, t-independent test was applied for relation between gender and size of defect. t-independent test was applied

for relation between age and the presence of a defect. After exclusion of those with no detectable defect, Pearson's correlation test was applied for relation between age and size of defect. t-independent test was applied for relation between BMI and the presence of a defect. After exclusion of those with no detectable defect, Pearson's correlation test was applied for relation between BMI and size of defect. The level of significance was set at probability (P) value <0.05.

Results

Ages of patients ranged from 16 to 57 years (mean 35.06, SD \pm 11.85). They included 71 females (44.4%) and 89 males (55.6%). BMI ranged from 19 to 47Kg/m² (mean 30.95, SD \pm 6.3).

A defect was actually found at surgery in 144 patients (90%) and was used as point of first entry into the peritoneal cavity. The diameter of the defects as measured at operation ranged from 4 to 12mm (mean 7.47, SD \pm 2.42). With 95% confidence the population mean is between 7.09 and 7.84 (95% CI 7.09 to 7.84).

There was no statistical relationship between gender and the presence of a native umbilical defect nor with its size (Table 1). Age did not carry a significant relationship with the occurrence of a defect (Table 2). Likewise, BMI did not have a relationship with defect presence (Table 3).

Table 1. Relation between gender and the presence of a native umbilical defect (chi square test). Relation between gender and the size of umbilical defect (t-independent test).

		Yes		Total		P-value
		Count	%	Count	%	
Gender	Male	80	55.6	89	55.6	0.958
	Female	64	44.4	71	44.4	
		N	Mean	Std. Deviation		P-value
Size of Defect	Male	80	7.25	2.357		0.204
	Female	64	7.77	2.474		

Table 2: Correlation between age and the presence of a native umbilical defect (t-independent test)

	Defect Presence	N	Mean	Std. Deviation	P-value
Age (Year)	No	16	32.44	9.536	0.265
	Yes	144	35.40	12.091	

Table 3: Correlation between BMI and the presence of a native umbilical defect (t-independent test)

	Defect Presence	N	Mean	Std. Deviation	P-value
BMI (Kg/m ²)	No	16	30.06	9.263	0.609
	Yes	144	31.01	6.711	

No complications were encountered as a result of using the native umbilical defect as the point of first laparoscopic port entry.

Discussion

The umbilical defect is described as the only hernia defect that is programmed to close spontaneously in childhood, usually within the first two years of life (7). Researchers unexpectedly found that an umbilical defect existed in 25% of cases (3). Further evidence of higher incidences of a persistent native defect came with the widespread use of laparoscopic surgery, particularly when making the first incision through the umbilicus. This persistent defect was found at laparoscopic procedures in 100% of pediatric patients, whose ages extended up to the age of 18 (4).

It is a known fact that sharp laparoscopic entry is a major cause of intestinal and vascular injuries and of legal litigations. Despite accumulation of experience and development of instrumentation, the number of malpractice claims remained relatively constant over this time period. Entry-related complications accounted for 38% of the claims, intestinal injury being the major cause (9). Avoiding, or at best reducing entry-related injuries drove many surgeons to make use of the open laparoscopy technique that was described by Hasson (10). In this method the linea alba is incised under vision and the underlying peritoneum is picked up and is similarly incised under vision. The question is "If a natural fascial defect exists, why make another one?". In other words, why not make use of an already present easy access to the peritoneum. The evidence for the existence of a native umbilical defect in adults and to its prevalence is scarce. Furthermore, there is no mention of its size nor its relations to gender age and obesity. These were the reasons behind conducting the current study.

While the previously mentioned two clinical studies (4,5) claimed a 100% existence of a native umbilical defect, the current study found it in 90% of the studied Egyptian patients. The dissimilarity may be attributed to racial differences, the previous two studies having been carried out in USA and in Mexico, respectively. Another possibility arises from the finding that the smallest defects in the current study were four millimeters. As defects with smaller ones were not found, it is possible that they might exist but were too small to be easily delineated. It is logical, therefore, to suspect that a persistent umbilical defect might actually be present in a larger percentage of adults. It is recommended, therefore, that in future studies, more diligent search for smaller defects should be carried out.

The found range of diameters with a mean of 7.47mm and a median of 7mm is quite convenient to pick up the peritoneum with fine forceps to make a tiny incision under vision. Once safely in the peritoneal cavity, one can enlarge the peritoneal incision and the fascial defect, if needed, in order to effortlessly accommodate the first port placement. A possible benefit of this entry site technique is that by the end of the procedure the defect is closed and thus avoids the potential development of umbilical hernia in case of future rise of intra-abdominal pressure, e.g., by ascites. The native defect would not have been closed with any of the other entry techniques.

While the English language literature about the persistence of the defect is scarce, factors that may influence its presence and size were not mentioned. In the current study factors were analyzed for these relations. Gender was chosen because of probable enlargement of an already present defect caused by pregnancies. Contrary to expectations female gender was found to bear no relation to presence nor size of defect (Table 1). Similarly, neither age nor BMI were found to influence persistence of the defect (Table 2 & Table 3). As 90% of the sample had persistent umbilical defect -irrespective of gender- this approach seems suitable for use by the majority of the population. A further advantage is its suitability for access in cases of single incision laparoscopic surgery (SILS), which almost always makes use of an incision in the umbilicus.

In this study, access to the peritoneal cavity was universally speedy and easy. There were no intestinal nor vascular injuries related to entry of the first port, likely because entry was completed under vision and no force was used. However, we are unable to consider this a proof of safety as the sample size is small in relation to the low incidence of such complications. A larger sample size is required to test this point. Incisional hernias were not observed at the umbilicus during the six months follow up. In addition, there were no complaints of the umbilical cosmetic appearance as the incision scar was always hidden in the depth of the umbilical scar.

Conclusions

In conclusion, a persistent umbilical defect was observed in 90% of the studied patients. Introduction of the first laparoscopic trocar through the native umbilical defect is a simple, safe and speedy method and avoids inducing another defect.

Conflict of interest

None declared.

Ethical considerations

We obtained Kasr Alainy local ethical committee approval and was archived by number 22110. Informed consent was obtained from all individual participants included in the study.

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