



## “Sac Inversion” Or “Organ Dissection” In Childhood Sliding Hernia Surgery: A Comparative Study of The Results of The Two Methods

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## Abstract

**Introduction:** Sliding hernia is one of the most common types of hernias in children, and its proper treatment is crucial for gaining the best results. Therefore, in this study, we compared the results of children's sliding hernia surgery between the two methods of sac inversion or organ dissection methods.

**Materials and Methods:** This study is a retrospective cohort observational study on 153 children with a sliding hernia who underwent surgical treatment with one of the two methods of sac inversion or organ dissection in Hazrat Masoumeh Hospital between 2011 and 2016, and the rate of recurrence, length of operation, and complications in the two methods were compared.

**Results:** No complications occurred in any of the two groups. In the sac inversion group, zero percent, and in the sac dissection group, 1.6 percent of the patients had a recurrence, which was not a statistically significant difference ( $P=0.477$ ).

**Conclusion:** Based on the results of this study, it can be concluded that the results of children's sliding hernia surgery are similar in the two methods of sac inversion or organ dissection.

## Keywords

- sliding hernia
- children
- sac inversion
- organ dissection

## Introduction

A sliding hernia refers to the protrusion of a retroperitoneal organ through a defect in the abdominal wall, which may or may not be accompanied by the peritoneal sac and mesentery. The organs involved in this condition may include the cecum, ascending colon, an appendix on the right

side, sigmoid on the left side, or the uterus, fallopian tubes, ovaries, ureters, and bladder on each side.<sup>1-2</sup> According to the incidence rate, sliding hernias are categorized into three types: I, II, and III. Type I sliding hernias constitute about 95% of cases and are characterized by forming a portion of the peritoneal sac from the wall

of the abdominal organ. Type II sliding hernias include the organ and the mesentery, such that the mesentery forms a part of the peritoneal sac and accounts for approximately 5% of cases. Type III sliding hernias feature the protrusion of the organ itself, which usually has a small peritoneal sac or the sac does not exist at all; and is the least common.<sup>3</sup> Various surgical approaches with different techniques have been proposed to treat sliding hernias. Some researchers suggest replacing the hernia sac without opening it, while others prefer dissection of the organ and fixation of the sac. The latter approach was initially proposed by Bevan et al. in 1930 and formed the basis of contemporary modified techniques. Bevan believed that dissection and fixation were necessary because, in type I hernias, the opening of the sac is typically more prominent than its neck.<sup>4</sup> However, some researchers consider this work unnecessary and time-consuming, which can increase postoperative pain.<sup>5-6</sup> As the literature review indicates, no guidelines or instructions have been provided for selecting the optimal technique, and each method has specific advantages over the others.<sup>7-8</sup> Therefore, this study aims to design and conduct a comparative study

between the two techniques of simple insertion of the hernia sac and dissection of the organ and fixation of the sac to determine their respective recurrence rates and identify the safer and more effective method.<sup>9</sup>

## Materials and Methods

In the current study we conducted a retrospective analysis of patients who had undergone sliding hernia surgery with either methods of “sac inversion” or “organ dissection” at Hazrat Masoumeh Hospital in Qom city between 2011 and 2016. Sample size determination was based on the results of Othman et al.'s study.<sup>5</sup> The mean and standard deviation of postoperative pain in the simple hernia sac reduction group were 3.04 and 2.11, respectively. The mean and standard deviation of postoperative pain in the organ dissection and sac fixation group were 4.06 and 2.43, respectively. The first type of error was set to 5%, and the power was 80%, corresponding to 81 participants in each group. The study used the census sampling method, with exclusion criteria for patients with underlying diseases and severe hernias. The study evaluated several

variables, including age, gender, stuck organ, hernia side, complications, recurrence, duration of surgery, and its type. Incomplete follow-up files were attempted to be completed through phone calls. The study compared the recurrence rate, duration of surgery, and complications, such as infection, bleeding, pain, and obstruction between the two methods. Data were collected and entered into SPSS software version 22, with the mean and standard deviation calculated for quantitative variables and the frequency and frequency percentage for qualitative variables. Chi-square, independent t, and Fisher tests were used to compare the variables in the two groups, with a significance level of 0.05.

## Result

The average age of the examined patients in the organ dissection and sac inversion surgery groups were about 194 and 280 days, respectively; which despite the difference in the average age in the two groups, this difference was not statistically significant ( $P=0.07$ ). In girls, 59 (64.8%), and in boys, 32 (35.2%), the type of surgery was sac inversion. A statistically significant relationship was found between

gender and the type of surgery so that in both genders, the most kind of surgery was sac inversion. The average surgery time in the sac dissection surgery group was about 7.2 minutes. In the inversion surgery group, it was about 13.8 minutes, and the average difference between the two groups was statistically significant ( $P=0.000$ ). In the organ dissection surgery group, 17.7%, and in the sac inversion surgery group, 22% of the patients had bilateral involvement, which statistically did not show a significant relationship between the type of surgery and the side of the participation ( $P=0.50$ ). The highest number of stuck organs in sac inversion surgery was three organs in 37 people (40.7%). In the surgical method of organ dissection, the highest number of stuck organs was one organ in 54 people (87.1%). Also, a statistically significant relationship was found between the number of stuck organs and the type of surgical procedure ( $P=0.00$ ). In the organ dissection surgery group, 1 organ involvement was observed in 87.1% and the sac inversion group in 14.3% of patients and based on this, a statistically significant relationship was seen between the type of surgery, and the type of organ involvement, (86.50,  $P = 0.0002$ ). Regarding recurrence, we had only one repeat in the organ

dissection group. No statistical difference was found between recurrence and type of

surgery (P=0.41). Also, no complications were seen in both groups. (Table 1)

**Table 1:** Examination of the studied variables in the two groups of sac inversion and organ dissection.

Variable		Type of operation		P value
		sac inversion	organ dissection	
Age (days)		315.2 ± 280.04	233.16 ± 193.87	0.07
Gender	Boys	32 (35.2)	9 (14.5)	0.00
	Girls	59 (64.8)	53 (85.5)	
Duration of surgery (minutes)		13.8 ± 0.4	7.2 ± 0.12	0.00
Part	one-sided	71 (78)	51 (82.3)	0.52
	two-sided	20 (22)	11 (7.7)	
Trapped organ	One	13 (14.3)	54 (87.1)	0.00
	Two	18 (19.8)	8 (12.9)	
	Three	37 (40.7)	0 (0)	
	Four	23 (25.3)	0 (0)	
Recurrence	No	91 (100)	61 (98.4)	0.41
	Yes	0 (0)	1 (1.6)	

## Discussion

The results of this study demonstrate that neither of the two investigated surgical techniques was associated with complications.<sup>1</sup> Specifically, the sac inversion group had a recurrence rate of 0%, while the sac dissection group had a recurrence rate of 1.6%. However, this difference was not statistically significant.<sup>1</sup> The average operation time for the sac inversion group was 7.2 minutes, while for the sac dissection group, it was 13.8 minutes, with a significant statistical difference observed between the two groups.<sup>1</sup> Moreover, female patients were more commonly affected, with the fimbriae and tube being the most frequently affected organs in the hernia sac. Still, no significant differences were observed between the two surgical techniques concerning these factors.<sup>1</sup> In contrast, the recurrence rate was not significantly different between the two techniques. Still, the operation duration for the sac dissection method was substantially longer than for the inversion technique, without an increase in the recurrence rate.<sup>1</sup> In a separate study by Samra et al. (2013), a new sliding hernia surgical technique was introduced that involved organ dissection and the repair of the trapped organ with the hernia sac. Although five complications

were reported, including bleeding, hematoma, seroma, ileus, and testicular pain, no recurrence was observed in the 25 patients examined.<sup>7</sup> In another study by Hady et al. (2013), 167 hernia cases were examined across three groups: a non-opened hernia sac group, an opened sac group without ligation, and an opened sac group with ligation. The recurrence rate was highest in the non-opened sac group, while no significant difference was observed between the other two groups.<sup>5</sup> Our study observed no difference in the recurrence rate or complications between the two surgical techniques despite the difference in operation duration. Furthermore, a study by Suzuki et al. (2014) reported a recurrence rate of 0.4% in 317 hernia cases treated using the inversion method, with more female patients affected, which is consistent with our findings.<sup>8</sup> Lipskar et al. (2010) found no complications in 173 hernia cases undergoing inversion surgery, with a recurrence rate of 0.8%.<sup>9</sup> Guner et al. (2010) examined 63 children with hernias treated using either the dissection or inversion method and found no difference in recurrence rate between the two techniques.<sup>10</sup> In another study by Zallen et al. (2008), 30 children were treated using

the inversion technique without any complications or recurrences.<sup>11</sup> Similarly, a study by Vincent et al. (2011) found no significant differences in the frequency of complications or duplication between the inversion and sac dissection techniques in 186 children undergoing hernia surgery.<sup>12</sup> Finally, a study by Shah et al. (2013) reported no complications or recurrence in 155 children treated using the sac dissection technique.<sup>13</sup> However, our study observed one recurrence in the challenged children, which was limited by the small number of available samples. Efforts were made to compensate for this limitation by expanding the period under investigation. The results obtained in this study showed that there were no complications in any of the two investigated groups. In the sac inversion group, zero percent, and in the sac dissection group, 1.6 percent of the patients had a recurrence, which was not a statistically significant difference. In the sac inversion group, the average operation time was 7.2 minutes; in the sac dissection group, it was 13.8 minutes, which is a statistical difference. It had meaning. In addition, it was observed that the female gender was more than the male gender, so the most organs stuck in the sac were the fimbriae and the tube. Of course, no

significant difference was observed between the two types of surgery in any of the two factors. Also, there was no difference in the recurrence rate between the two methods; However, the duration of the operation in the organ dissection method had a significant increase compared to the inversion method, which, of course, was not accompanied by an increase in recurrence in patients. In the study of Samra et al. in 2013, they introduced a new technique of sliding hernia surgery, which was based on the dissection of the organ and the repair of the trapped organ with the hernia sac. In that study, 25 patients were examined. One case of intraoperative bleeding, one-point subcutaneous hematoma, one scrotal seroma, one point of ileus, and one case of transient testicular pain were reported. No chance of hernia recurrence was written in this study.<sup>7</sup> In our study, of course, one case of recurrence was observed in the group under organ dissection; But no side effects were observed, which can indicate the surgeon's skills in this field. In a study conducted in 2013 by Hady et al., 167 hernia cases were examined in three groups; The first group included 54 hernia cases for which the hernia sac was not opened, and only a simple reduction was

performed. The second group contains 56 hernia cases for which the hernia sac was opened. Still, ligation was not performed, and the third group includes 57 hernia cases for which, in addition to opening, Sac ligation was also performed. The results of this study show that the rate of hernia recurrence was higher in the first group, where only a reduction was completed. Still, there was no difference between the other two groups, and the result of that study was that hernia sac ligation is time-consuming during surgery. It is considered a hernia, and it does not affect the rate of hernia recurrence.<sup>5</sup> In our study, despite the difference in the duration of the operation, no difference was observed between the rate of repeat and complications. In a study conducted by Suzuki et al. in 2014, 317 hernia cases were treated by the inversion method, of which 145 hernia cases were in boys and 172 hernia cases were in girls, which, like our study, were more female. The study's results showed that recurrence occurred in only one case out of 250 patients followed up (0.4 percent), which indicates the acceptability of this technique regarding reproduction after surgery.<sup>8</sup> In our study, this method is also used. It showed the same efficiency as the sac dissection method. In a survey conducted

by Lipskar et al. in the United States and the results of which were published in 2010, by examining 173 cases of hernia undergoing inversion surgery, it was determined that none of them had side effects. In addition, the recurrence rate in the examined patients was 0.8 percent, which is similar to the results of our research. Also, in that study, 34% of the hernia cases underwent bilateral surgery,<sup>9</sup> less in our study and around 20%. In a survey conducted by Guner et al. in America and the results of which were published in 2010, 63 children with hernias, which were bilateral in 25% of cases, were examined and treated with one of the dissection or inversion methods. It was determined that only two cases of recurrence occurred after the inversion operation. Recurrence was not observed in the dissection method, and there was no difference between the two methods,<sup>10</sup> which is in line with our research findings. In the study by Zallen et al. in America, the results were published in 2008, examining 30 children, all of whom underwent inversion hernia treatment, and none had any complications. In the follow-up, none of the children did have a recurrence,<sup>11</sup> and in our study, only one recurrence was observed in all patients. In a study

conducted by Vincent et al. in India, the results of which were published in 2011, they examined 186 children undergoing hernia surgery. Half of them were operated with the inversion method, and the other half with the sac dissection method. It was found that there is no significant difference between the frequency of side effects and recurrence between the two groups,<sup>12</sup> which is consistent with the findings obtained in our research. In the study by Shah et al. in India, the results of which were published in 2013, by examining 155 children, all of whom were treated for hernia by sac dissection, and none of them had complications during the surgery and also in the follow-up. None of the examined children suffered a relapse,<sup>13</sup> and although no complications were observed in our study, one recurrence was seen in the challenged children. The small number of available samples was the most crucial limitation of this study, which was tried to be compensated for by expanding the period under investigation as much as possible.

## Conclusion

Finally, based on the results of this study and their comparison with other similar studies in this field, it is concluded that the results of children's sliding hernia surgery are identical in the two methods of sac inversion or organ dissection. Each of these two methods, paying attention to the patient's condition and the doctor's discretion, can be done.

## Ethical Consideration

This human subject research complied with all the relevant national regulations, institutional policies, and tenets of the Helsinki Declaration, and also, was approved by the Ethics Committee of Qom University of Medical Sciences, Qom, Iran (Ethical Code: IR.MUQ.REC.1397.095).

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**Conflict of interests**

There is no conflict of interest

**References**

1. LeBlanc, Karl A., Andrew Kingsnorth, et al: Management of abdominal hernias. No. 144709. London: Springer, 2018.
2. Hallén M, Sevonius D, Holmberg H, et al: Low complication rate and an increasing incidence of surgical repair of primary indirect sliding inguinal hernia. *Langenbeck's archives of surgery*. 2016;401:215-22.
3. Andresen K, Bisgaard T, Rosenberg J: Sliding inguinal hernia is a risk factor for recurrence. *Langenbeck's archives of surgery*. 2015;400:101-6.
4. Bevan AD: Sliding hernias of the ascending colon and caecum, the descending colon and sigmoid, and of the bladder. *Annals of Surgery*. 1930;92(4):754.
5. Othman I, Abdel Hady H: Hernia sac of indirect inguinal hernia: Invagination, excision or ligation? *Ain Shams Journal of Surgery*. 2014;7(2):313-9.
6. Abdulhai SA, Glenn IC, Ponsky TA: Incarcerated pediatric hernias. *Surgical Clinics*. 2017;97(1):129-45.
7. Samra NS, Ballard DH, Doumite DF, et al: Repair of large sliding inguinal hernias. *The American Surgeon*. 2015;81(12):1204-8.

8. Suzuki M, Hatanaka M, Fujino J, et al: Safety and efficacy of selective sac extraction method of inguinal hernia repair in children: results of a prospective study. *Pediatric surgery international*. 2014;30:499-502.
9. Lipskar AM, Soffer SZ, Glick RD, et al: Laparoscopic inguinal hernia inversion and ligation in female children: a review of 173 consecutive cases at a single institution. *Journal of pediatric surgery*. 2010;45(6):1370-4.
10. Guner YS, Emami CN, Chokshi NK, et al: Inversion herniotomy: a laparoscopic technique for female inguinal hernia repair. *Journal of laparoendoscopic & advanced surgical techniques*. 2010;20(5):481-4.
11. Zallen G, Glick PL: Laparoscopic inversion and ligation inguinal hernia repair in girls. *Journal of Laparoendoscopic & Advanced Surgical Techniques*. 2007;17(1):143-5.
12. Vincent P, Singh Y, Joshi C, et al: Recent trends in dealing with inguinal hernial sac. *Medical Journal Armed Forces India*. 2003;59(2):108-10.
13. Shah R, Arlikar J, Dhende N: Incise, dissect, excise and suture technique of laparoscopic repair of paediatric male inguinal hernia. *Journal of minimal access surgery*. 2013;9(2):72.