

CLINICAL AND DEVELOPMENTAL CONSIDERATIONS FOR LAPAROSCOPIC INGUINAL HERNIA REPAIR IN CHILDREN

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Abstract: Laparoscopic surgery (LS) for surgical repair of inguinal hernia (IH) in children tends to be performed routinely, with some advantages over the conventional open surgery. The purpose of this paper is to assess cases of patients that have undergone surgery for HI repair. The medical charts of LS patients were studied retrospectively. Of the 46 patients included in the study, 60.8 % were aged < 7 years old, 41.30 % came from urban areas, 27 patients presented with bilateral IH, 14 had various comorbidities, 8 exhibited different postoperative complications, and the average length of stay was 3.69 days. LS was significantly more common in patients < 7 years of age, coming from urban areas (p 0.001), who exhibited significantly more frequent pre- and postoperative complications (p 0.04 and p 0.03, respectively). Unilateral IH, regardless of patient age, was found to develop fewer complications (p 0.03) and to require fewer days of hospital stay (p 0.008). Therefore, it can be concluded that LS is a safe procedure, with few complications and short length of hospital stay.

Cuvinte cheie: hernia inghinală la copii, chirurgie laparoscopică, avantaj

Rezumat: Chirurgia laparoscopică (CL) pentru cura chirurgicală a herniei inghinale (HI) la copii tinde să fie efectuată de rutină, cu unele avantaje față de chirurgia convențională. Lucrarea are ca obiectiv evaluarea cazurilor operate pentru HI. Au fost studiate retrospectiv fișele de observație ale pacienților cu CL. Din cele 46 cazuri, 60,8% au avut vârsta <7 ani, 41,30% au provenit din mediul urban; 27 cazuri au fost HI bilaterale; 14 au prezentat diverse comorbidități, 8 diverse complicații postoperatorii; durata medie de spitalizare a fost 3,69 zile. CL a fost semnificativ mai frecventă la pacientul <7 ani provenit din mediul urban (p 0,001) care prezintă și complicații pre- și postoperatorii semnificativ mai frecvente (p 0,04, respectiv p 0,003). HI unilaterale, indiferent de vârsta pacientului, dezvoltă mai puține complicații (p 0,03) și necesită mai puține zile de spitalizare (p 0,008). În concluzie, CL poate fi considerată o procedură sigură, cu puține complicații și durată scurtă de spitalizare.

INTRODUCTION

Currently, laparoscopic surgery for surgical repair of inguinal hernia in children tends to be performed routinely, with some benefits over classic surgery, such as: excellent visualization of the operative field, small incisions, fewer complications, better postoperative aesthetic outcomes as compared to classic surgery, and recurrence rates comparable with traditional open surgery. Open inguinal hernia repair, referred to in the literature as open herniotomy, is still one of the most commonly used surgical procedures in infants and children. Open herniotomy is the standard treatment of inguinal hernia in the world and therefore in Romania, where it seems to be preferred to laparoscopic surgery. The minimally invasive and laparoscopic techniques (1-4) introduced in the last 2-3 decades have proved to have major benefits over traditional open surgery techniques in terms of surgical stress (5-7), recovery times, postoperative pain, complications, and recurrence. The present study is meant as an attempt to review the laparoscopic procedures performed in Romania, more specifically laparoscopic inguinal hernia repair in children, which barely amounted to 46 cases in September 2013. Although, at first glance this figure may seem immaterial in drawing relevant conclusions, the case mix can provide

relatively sufficient data to explain how such surgical procedures are accounted for.

PURPOSE

The main objective of the study is to assess: structure of the case mix operated on by laparoscopic surgery, according to discharge diagnosis, length of stay, procedures recorded in the surgical protocol; case mix structure according to complications, either: preoperative, intraoperative and postoperative.

METHODS

This is a retrospective longitudinal study that includes all the 46 cases of unilateral or bilateral inguinal hernia repaired by laparoscopic surgery admitted between 2011 and 2013 in the Pediatric Surgery and Orthopedics Department of Bacău County Emergency Hospital, led by Dr. Mihai Galinescu.

Selection of cases was performed by patients' medical charts. There were studied the following parameters: date of admission, age, gender, origin area; previous surgical procedures for the same condition/for other conditions/other diseases; length of stay, discharge diagnosis; procedures recorded in the surgical protocol; preoperative, intraoperative, and postoperative complications. The data obtained from the study were processed statistically: the results considered as

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having normal constant distribution were expressed by average + SD values; other data were expressed by interquartile range averages; two-tailed t tests were used to analyze the differences between the groups; however, in the case of equal distribution of data, nonparametric tests were used; Chi-square tests or Fisher's exact tests were used to compare proportions.

RESULTS

46 cases of child inguinal hernia were corrected by laparoscopic surgery between 2011 and 2013: 2 cases in 2011, 11 cases in 2012 and 33 cases in 2013.

Analysing the structure of this case mix, the following results have been recorded:

- *according to age*, there was a significant number of surgically repaired cases of hernia between the ages of 1 and 14, of which the best represented age group was that of 3-7 years old (18 cases, 39.13%).

Table no. 1. Repartition of cases by age group

Age group	0 - 6 months	6 - 12 months	1 - 3 years	3 - 7 years	7 - 14 years	> 14 years
No. of cases	1	0	9	18	14	4

- *according to the origin area*, there were 27 cases coming from rural areas and 19 cases coming from urban areas;
- *according to the number of previous surgeries*, only one case had undergone surgery to correct the same condition; however, the previous surgery had been to repair a contralateral inguinal hernia, therefore it was not a case of recurrence; other 3 patients had undergone surgery for conditions other than inguinal hernia, namely one for kidney stones, one case of appendectomy, and one case with two previous surgeries – one for left kidney hydronephrosis and an appendectomy.
- *according to the length of stay*, most cases, 37, required < 5 days of hospital stay, and 8 cases between 5 and 7 days; the average length of stay was 3.69 days;

Table no. 2. The repartition of cases by length of stay

No. of days	2	3	4	5	6	7
No. of cases	6	16	16	4	2	2

- *according to the discharge diagnosis*: 21 cases of unilateral inguinal hernia without obstruction; 8 cases of unilateral inguinal hernia with obstruction, of which 2 cases of incarcerated hernia (1 case of incarcerated fallopian tube) and 2 cases of strangulated hernia; 4 cases of strangulated inguinoscrotal hernia; 8 cases of bilateral inguinal hernia without obstruction; 5 cases of bilateral inguinal hernia with obstruction, of which 2 cases with left-sided strangulation; 6 cases of peritoneal adhesions; 2 cases of iron-deficiency anemia; 1 case of nonspecific cystitis; 4 cases of balano-preputial synechiae; 7 cases of testicular hypotrophy, of which 3 cases of undescended testis; 1 case of bilateral retractile testes; 2 cases of balanoposthitis; 1 case of phlegmonous appendicitis; 1 case of left-sided varicocele; 1 case of communicating hydrocele; 4 cases of occlusive syndrome, of which 1 case with internal occlusion; 3 cases of severe 5% dehydration; 1 case of hypotonic syndrome; 1 case of psychomotor impairment; 1 case of familial hypercholesterolemia; 1 case of staph skin infection.
- *according to surgical protocol*: 24 cases of laparoscopic correction of unilateral inguinal hernia without obstruction; 14 cases of laparoscopic correction of bilateral inguinal hernia; 8 cases of laparoscopic correction of unilateral inguinal hernia with obstruction (strangulation); 6 cases of laparoscopic orchidopexy (3, left sided, 2, right sided, 1, bilateral); 6 cases of laparoscopic adhesiolysis; 3 cases of exploratory laparoscopy; 3 cases of laparoscopic hydrocele repair; 1 case of partial

omentectomy; 4 cases of balano-preputial synechiae lysis; 1 case of laparoscopic treatment of phlegmonous appendicitis; 1 case of laparoscopic treatment of varicocele; 2 cases of wound dressing and lavage.

- *according to complications*: preoperative complications - 6 cases of adhesions, 8 cases of occlusive syndrome, of which 3 cases of severe 5 % dehydration), intraoperative and postoperative complications - 2 cases of bleeding/anemia; 5 cases of swelling (2 cases of mild clinical forms, 3 cases of moderate clinical forms); 1 case of nonspecific cystitis.

DISCUSSIONS

- *Age of admission* may justifiably be related to the origin area, length of stay, worsening of hernia (strangulated hernia):
 - inguinal hernia surgery is significantly more frequent (p 0,001) in children aged < 7, coming from urban areas, than in children aged > 7;
 - children aged < 7 require significantly fewer days of hospitalisation than children aged > 7 (p 0,01);
 - hernia strangulation is not influenced by age (p 0,57); the significantly higher number of surgical interventions for inguinal hernia in children aged < 7 as compared to children aged > 7 is explained to some extent by the more frequent physical examinations undergone by children aged < 7, which facilitate determination of diagnosis and recommendations for treatment, including surgery, more common in this age; moreover, preschool children (< 7 years of age) generally benefit from more home health care than school children (> 7 years of age), which results in shorter length of stay due to increased home care opportunities; of course, as demonstrated in the present study, strangulation is not age-related, or very little so; it is mainly caused by functional and anatomic features of the hernia and by increased intra-abdominal pressure.
- In terms of the relation between *hospitalization period* (month of admission) and age, origin area and postoperative complications, the following conclusions have been reached:
 - the number of surgical procedures in children aged < 7 was found to be significantly higher in summer than in winter (p 0,07);
 - the number of surgical procedures in patients coming from urban areas was found to be significantly higher (p 0,05) in summer, as compared to patients coming from rural areas;
 - postoperative complications are significantly more common in summer than in winter (p 0.01); the number of surgical procedures and postoperative complications is naturally higher during the summer months given that the access to pediatric surgery hospitals is more difficult in winter and, since the number of procedures is higher in summer, it is only natural that postoperative complications be more common during the summer months; moreover, patients coming from urban areas have easier access to pediatric surgery hospitals as compared to patients coming from rural areas; generally speaking, pediatric population turnout in hospitals to benefit from medical or surgical services for treatment of non-acute conditions is higher in summer than in winter, irrespective of

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patient background, because the length of the summer holiday allows for access to medical services.

- In terms of the relation between pre-, intra- and postoperative *complications* and age, length of stay and type of hernia, the following conclusions have been reached:
 - postoperative complications were found to be significantly more common in children aged < 7 (p 0,04);
 - postoperative complications were also found to be significantly more common in children aged < 7 (p 0,003); the higher frequency of pre, intra and postoperative complications in children aged < 7 is directly related to the higher number of procedures performed in this age range.
 - absence of preoperative complications reduces significantly hospital length of stay (p 0,05); absence of postoperative complications reduces significantly hospital length of stay (p 0,01); it is almost needless to say that minimally-invasive surgery such as laparoscopic surgery, without complications requires shorter hospital length of stay than a procedure followed by complications.
 - unilateral hernias develop significantly fewer complications than bilateral hernias (p 0,03); unilateral hernias require significantly shorter hospital stay than bilateral hernias (p 0,008);
 - the type of hernia (unilateral or bilateral) is not influenced by age (p 0,63);
 - type of hernia does not create a predisposition to comorbidities (p 0,9) unrelated etiopathogenically to the hernia itself;
 - type of hernia (unilateral or bilateral) is naturally related to the number of complications (lower in the case of unilateral hernia than in bilateral hernia) and to length of stay (higher in the case of bilateral hernia than in unilateral hernia); as demonstrated in the present study, age is not a relevant factor in the etiopathogenesis of inguinal hernia in children, and more so in the type of hernia - unilateral or bilateral;
 - just as immaterial is the correlation between comorbidities and type of hernia, either unilateral or bilateral (p 0,9);
 - there is no direct correlation between postoperative complications and preoperative comorbidities unrelated to the etiopathogenesis of hernia.

5. Preoperative complications were found to be significantly more common in children aged < 7 (p 0,04) and postoperative complications were found to be significantly more common in children aged < 7 years (p 0,003).
6. Absence of preoperative complications reduces length of stay significantly (p 0,05); absence of postoperative complications also reduces length of stay (p 0,01).
7. Unilateral hernias develop significantly fewer complications than bilateral hernias (p 0,03) and require significantly fewer days of hospital stay than bilateral hernias (p 0,008).
8. The type hernia (unilateral or bilateral) is not influenced by age (p 0,63); does not create a predisposition to comorbidities (p 0,9) unrelated etiopathogenically to the hernia itself.

There is no direct correlation between postoperative complications and preoperative comorbidities unrelated to the etiopathogenesis of hernia.

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CONCLUSIONS

1. Of the cases operated by laparoscopic surgery, most cases were found to belong to the < 7 age group (28 cases, 60,8 %) and to come from rural areas (27 cases, 50,86 %).
2. With regard to length of stay, most cases (38 cases, 82,60 %) required < 5 day hospital stay, while the remaining 8 cases (17,40 %) required ≥ 5 day (5-7 days) hospital stay.
3. The average length of stay was found to be 3.69 days.
4. According to surgical protocols, of the 46 cases under examination, there were: 24 cases of laparoscopic correction of unilateral inguinal hernia without obstruction; 14 cases of laparoscopic correction of bilateral inguinal hernia without obstruction; 8 cases of laparoscopic correction of unilateral inguinal hernia with obstruction (strangulation).