DANISH MEDICAL JOURNAL

Original Article

Dan Med J 2023;70(10):A02230121

A qualitative study of groin hernia management in adolescents

Hugin Reistrup, Joachim H. H. Olsen, Siv Fonnes & Jacob Rosenberg

Center for Perioperative Optimization, Department of Surgery, Copenhagen University Hospital – Herlev Hospital, Denmark

Dan Med J 2023;70(10):A02230121

ABSTRACT

INTRODUCTION. Groin hernias in adolescents are rare and their management is associated with challenges for surgeons as some adolescents are fully grown, whereas others are not. Current groin hernia guidelines only differentiate between young children and adults; hence, no guidelines exist that may aid surgeons in handling adolescents. The aim of this study was to explore surgeons' considerations on the management of groin hernias in adolescents.

METHODS. We conducted a qualitative study using pilot-tested individual semi-structured interviews. The participants were surgical specialists with experience in groin hernia repair in adolescents aged 10-17 years. Data were analysed using content analysis where essential quotes were extracted from transcripts and coded, categorised and interpreted into themes.

RESULTS. Sixteen surgeons were included. Their considerations were reflected in four themes: 1) mesh-related concerns, 2) watchful waiting, 3) growth and 4) lack of evidence and guidelines. Surgeons performed sutured repairs on adolescents who are still growing due to concerns about mesh-related complications. A watchful waiting strategy was used by some to postpone surgery until adolescents were fully grown, thereby enabling mesh repair. Methods for evaluating growth varied and were not standardised. Finally, surgeons highlighted the need for evidence and guidelines to support their decision-making.

CONCLUSIONS. This study found a lack of consensus and uniformity on the management of groin hernias in adolescents. Increased research efforts producing clinical guidelines are needed.

FUNDING. This study was funded by the Michaelsen Foundation, the Aage and Johanne Louis-Hansens Foundation, Direktør Emil C. Hertz and Hustru Inger Hertz' Foundation, and the Torben and Alice Frimodts Foundation. The funders had no role in the design, conduct or reporting of the study.

TRIAL REGISTRATION. not relevant

Choosing a management strategy for groin hernias in adolescents can be challenging. Physical growth varies considerably between adolescents, and they can grow rapidly in a short amount of time. Well-established and regularly updated international guidelines on groin hernia management are available for adults [1]; but for adolescents, no international consensus or guidelines exist. Compared with young children and adults, groin hernia repairs in adolescents are rare [2, 3]. Today, in most modern surgical settings worldwide, children under ten years are operated with a non-mesh approach [4, 5] and adults aged 18 years or more with a mesh approach [1]. Meanwhile, uncertainty remains as to how patients aged 10-17 years should be managed. A watchful waiting strategy may safely be used for asymptomatic inguinal hernias in adults [6] but not in young children [7], and most surgeons would repair asymptomatic inguinal hernias in adolescents within a few months [8].

In an area with sparse pre-existing evidence and to guide future research, individual interviews may provide an

intuitive approach to obtaining an in-depth understanding and uncover the current practice and considerations of surgeons with experience in groin hernia repair in adolescents. Therefore, the aim of this study was to explore surgeons' considerations on the management of groin hernias in adolescents aged 10-17 years.

METHODS

This was a qualitative study exploring participants' experiences with and considerations of the management of groin hernias in adolescents. The study was reported according to the Consolidated Criteria for Reporting Qualitative Research guideline [9]. Approval for this study was granted by the Danish Data Protection Agency (P-2022-861). Approval from the local ethics committee was not required under Danish law [10]. Participants provided informed consent and the study was conducted in compliance with the Declaration of Helsinki [11].

Participants were surgical specialists from public and private hospitals across Denmark with experience in groin hernia surgery in adolescents aged 10-17 years. Purposive sampling was used to select participants [12]. A list of eligible surgeons was drawn up in collaboration with board members of the Danish Hernia Database. Eligible participants were contacted directly by email, and interviewed participants recommended other eligible surgeons who were then approached for participation (snowball sampling). Sample size was determined by conducting interviews until achieving code saturation. A semi-structured, open-ended interview guide [13] was developed by the first author and critically revised by the author group until a consensus was reached. All interviews were conducted one-to-one by phone by the first author (a male, medical doctor and PhD student of the subject), whom none of the participants knew beforehand. One interview was held with each participant in a setting of their choice (work, home or while commuting). The interview guide was pilot tested on an experienced hernia surgeon. Recordings were taped and transcribed verbatim. Data were analysed using content analysis [14]. Both manifest and latent content was analysed [15]. Data were analysed in a cyclic process, repeatedly returning to the data during the process of analysis. Full quotes from transcripts were condensed into short sentences containing only the essential content of the text. These short sentences were further condensed into codes, labelling the quote. Codes were then sorted into categories and categorised data were interpreted for their essential meaning. The interpretation of what these data meant was then formulated into themes. Data were analysed by the first author. The analyses were rigorously and critically revised by the second author and discussed until a consensus had been reached.

Trial registration: not relevant.

RESULTS

In total, 35 surgical specialists were approached for potential inclusion in this study. Among these, 25 (71%) responded. Nine reported that they had no experience in operating adolescents, and none refused to participate. The remaining 16 surgeons were all included, see **Table 1** for their characteristics. Among these, 69% had operated 20 or fewer groin hernias in adolescents. The median duration of the interviews was 26 minutes (range: 15-51 minutes). Analysis produced four themes: 1) mesh-related concerns, 2) watchful waiting, 3) growth and 4) lack of evidence and guidelines.

TABLE 1 The characteristics of the 16 surgeons who were interviewed.

Sex, n (%)	
Male	12 (75)
Female	4 (25)
Age, median (IQR), yrs	53 (45-63)
Time since becoming surgical specialist, median (IQR), yrs	14 (4-17)
Hospital type/setting, n (%)	
Public hospital	14 (87.5)
Private hospital	2 (12.5)
Position, n (%)	
Chief physician	11 (69)
Senior registrar	5 (31)
Total estimated groin hernia repairs, median (IQR), n	
All ages	550 (300-1,750)
Adolescents: aged 10-17 yrs	18 (5-34)
Time since last adolescent groin hernia repair, n (%)	
< 1 yr	8 (50)
1-9 yrs	6 (37.5)
≥ 10 yrs	2 (12.5)

IQR = interquartile range.

Mesh-related concerns

The decision on whether to use a mesh or a non-mesh approach was often described as challenging by the surgeons. All surgeons performed open repairs in adolescents with non-mesh techniques, whereas a laparoscopic approach was used for all mesh repairs. Placing a mesh in the groin of adolescents who were not fully grown worried surgeons due to the lack of adaptability of the mesh to the surrounding growing tissue (**Table 2**, surgeon (S)11). The fear of postoperative chronic pain was often the main reason for reluctance to use mesh. Also, despite using mesh, some were concerned about the risk of recurrence due to mesh displacement. The suspected aetiology of chronic pain was often mechanical (Table 2, S16), with one surgeon mentioning the

lack of evidence behind that reasoning (Table 2, S8). Consequently, most surgeons would never use a mesh in adolescents who were not fully grown (Table 2, S7). Also, even though adolescents were regarded as fully grown, some chose a non-mesh approach for fear of mesh-related complications (Table 2, S2).

TABLE 2 The citations from surgeons (S) categorised under each of the four themes: mesh-related concerns, watchful waiting, growth and lack of evidence and guidelines.

ID	Citation
Mesh-related concerns	
S11	"The problem as I see it, is that it [mesh] is a plastic material implanted in the abdominal wall to reduce the risk of recurrence. But the mesh doesn't grow. There is no adaptation of the mesh. So, the surrounding tissue grows, but the mesh will stay where it was placed"
S16	"It is primarily a mechanical concern. We fixate the mesh with tacks, and if the mesh shrinks slightly and the patient grows at the same time, then I would be worried about pain. Also, I would be worried about displacement of the mesh if the patient grows markedly afterwards"
S8	"We have some sort of an inherited idea that the risk of chronic pain increases if we insert a mesh in patients who are not fully grown. It is probably more an experience-based than an evidence-based thing"
S7	"I never use mesh in adolescents because they are not fully grown. I don't think you should implant a foreign body, which is static in size, into someone when you don't know how much they will grow"
S2	"I would almost always use a non-mesh approach in young patients. You haven't burned any bridges when you haven't used a mesh. If their hernia recurs, then you can always proceed to an operation with a mesh, but you can't go the other way around. If you have implanted a mesh [and need to remove it again], it can be very complicated and entail a great risk of damage to nerves and vessels"
Watchful waiting	
S15	"In young adolescents, the argument for watchful waiting would be to repair the hernia as an adult hernia with a mesh-based laparoscopic technique. I would be worried about the risk of recurrence if doing a non-mesh repair"
S11	"The operation is performed in general anaesthesia, and I don't think you should sedate children without good reason. And I don't think an asymptomatic hernia necessarily requires surgery. Especially in young adolescents, I think you should wait and see"
S6	"I have experienced conflicts between parents a few times where one thinks the child should be operated on, whereas the other does not. And then I usually say, if you don't agree, then we will not do the surgery. Then you can go back home because then it can't be that big a problem. Go home and wait for a while and come back if you agree later and think that surgery is a good idea"
S3	"If an adolescent is aged 17 and might still grow a couple of centimetres, then I might consider a conservative strategy. But if I see a 13-year-old adolescent, then that patient has to live with the hernia for many years, while he or she is still growing. In that case, I would always recommend surgery and not wait due to the risk of incarceration"
S4	"Adolescents heal well. I think their immature nervous system is better at coping with pain than the mature system is. In my experience, they experience less pain and get fewer recurrences. That could be an argument for repairing their hernia while they are adolescents and preadolescents"
Growth	
S8	"The height of the patient is more important than age. I ask the adolescent and parents how much the patient has grown within the past year. Also, I assess the stature of the patient and compare with the parents. Based on that, it is a professional assessment if I consider the adolescent to be fully grown, and if the assessment corresponds to what they are telling me"
S3	"I ask about the height of the parents and then I google the expected final height of the patient. I also ask the patient if he or she is still growing"
S5	"If I see 13-14-year-old girls who are menstruating, then I often offer them a laparoscopic [mesh] repair as I would then estimate that they are more or less fully grown. Similarly, if I see a 15-17-year-old boy who is taller than his father, then he is probably fully grown and is also offered a laparoscopic [mesh] repair"
S4	"I use height and smoking status. If I see a 17-year-old who hasn't grown since the age of 16 and is also smoking, then that is definitely an argument for using a mesh as I would otherwise be worried about the risk of recurrence."
S14	"You can look at the content of the testicles to determine if the patient is fully grown. Generally, I would evaluate the testicles, pubic hairs and the anatomy of the groin"
Lack of evidence and guidelines	
S15	"I would very much like there to be some kind of guideline that you could follow. I am very focused on following guidelines to the letter and doing what is professionally agreed to be the right thing to do. And here we are in a bit of a no man's land. I just want to do the right thing and when there is no guideline, you have to feel your way forward a little bit"
S10	"I would like to hear some more about this as you have interviewed surgeons from other places. Are there a lot of places where one chief physician operates the adolescents or are the adolescents just a part of the everyday surgical setup? Because I don't believe that there are a lot of surgeons who operate on adolescents frequently"
S14	"I want to ask you, are my answers similar to the other surgeons'? Because there is no evidence on this topic."
S5	"This whole area is completely undecided. There has been an understanding that children do well following hernia repair, but how do we know that when we don't register anything about them? In fact, we don't really know if our current treatment approach is correct. I think that it would be great to have children registered in the [Danish Hernia] database as, in the long run, we would then gain quite a lot of knowledge about this"
S3	"I can't understand why adolescents are not registered in the [Danish Hernia] database. It would be interesting to see how many get a recurrence, how many get a groin hernia on the other side and if they have other hernia-related problems later in life"

ID = identification.

Watchful waiting

Some surgeons described that they would apply a watchful waiting strategy in selected adolescents with asymptomatic hernias. In contrast, others argued for early repair. Arguments among surgeons in favour of watchful waiting varied. Some surgeons were worried about the risk of recurrence after non-mesh repairs and, therefore, postponed surgery to perform a mesh repair when adolescents were fully grown (Table 2, S15). Others

argued for a conservative strategy due to the stress associated with going through surgery at a young age (Table 2, S11). Also, several surgeons applied a conservative strategy when either parents or parents and patients were unable to agree if the hernia should be repaired (Table 2, S6). Among those arguing for early repair, one surgeon distinguished between young and old adolescents and believed that young adolescents should have their hernia repaired without delay due to the risk of incarceration (Table 2, S3). Another surgeon also argued for early repair as the surgeon had experienced that the risk of recurrence and chronic pain was low in adolescents (Table 2, S4).

Growth

For most surgeons, the stage of physical growth was the decisive factor when determining the preferred management strategy. Various methods for assessing growth were described. Generally, the expected height of the adolescent – often relative to the height of the parents – was the most frequently mentioned method to estimate growth (Table 2, S3, S4, S5 and S8). Surgeons would simply look at the height of the patient and parents while also asking questions about recent growth of the adolescent. Growth was a more important parameter than chronological age (Table 2, S8). No standardised tools were described for estimating growth, though some sought help from information via search engines on the internet (Table 2, S3). In girls, some also used the combination of age and debut of menstruation as an indication of the stage of growth (Table 2, S5). In one case, a surgeon described using both height and smoking status to determine the treatment approach (Table 2, S4). Another surgeon described evaluating the testis, growth of pubic hairs and groin anatomy (Table 2, S14).

Lack of evidence and guidelines

The lack of evidence and guidelines on this topic was frequently highlighted as an issue. One surgeon was used to follow guidelines strictly and described the challenge of not having available literature to support decision-making in adolescents (Table 2, S15). Surgeons also often showed an interest in the results of the interviews conducted for the present study, as they were curious about how other surgeons managed groin hernias in adolescents (Table 2, S10). Furthermore, one surgeon was curious if the surgeons' answers were similar to other surgeons' answers (Table 2, S14). Surgeons frequently mentioned that it was a problem that children and adolescents are not registered in the Danish Hernia Database as this would potentially provide valuable knowledge about these patients (Table 2, S5). One surgeon highlighted that the Danish Hernia Database could uncover specific outcomes in adolescents, such as recurrence, if they develop contralateral groin hernias and if they have chronic issues related to the operated groin later in life (Table 2, S3).

DISCUSSION

Four themes related to the management of groin hernias in adolescents were identified in this qualitative study. First, a general concern was recorded about long-term mesh-related complications and, hence, a reluctance to use mesh in growing adolescents. Second, some adopted a watchful waiting strategy as a bridge to perform mesh repair, while others argued for early repair. Third, physical growth was most frequently used when deciding on a management strategy, especially height, but the methods for assessing growth varied considerably and were not standardised. Fourth, surgeons highlighted the need for evidence and guidelines to assist them in their decision-making.

This study found that surgeons were challenged when presented with groin hernias in adolescents. Most surgeons would treat fully grown adolescents with a laparoscopic mesh repair to lower the risk of recurrence, whereas an open sutured repair was used in growing adolescents primarily due to concerns about chronic pain, but also because of concerns for recurrence due to mesh displacement. Concerns about chronic pain in young adults were also raised after a binational survey conducted in 2000 [16]. However, a recent network meta-analysis found no difference in chronic pain between non-mesh and mesh repairs in adults [17]. With respect to

recurrence, a study based on prospectively collected data in the Danish Hernia Database suggested low reoperation rates after sutured repairs in young males [18], and use of non-mesh techniques for small hernias in young males has been suggested [1]. Concerns about a potentially increased risk of chronic pain after mesh repairs and indications of a low risk of recurrence after non-mesh repairs in young adult patients may indicate that a non-mesh approach is the most appropriate approach in selected adolescents regardless of their growth status. When feasible, many surgeons in this study also preferred a watchful waiting strategy to delay surgery until the completion of physical growth was certain, thereby enabling a mesh repair. A consideration not covered in this study or the existing literature is the patients' perspectives and viewpoints, which may be important when determining a management strategy.

Estimating the stage of physical growth, especially growth spurts, during pubertal development was decisive for surgeons when deciding on a management strategy. Height was used by most surgeons, but methods varied considerably and no surgeons used recognised, standardised methods. Though still discussed, well-established methods to evaluate growth like growth curves and hand radiographs exist [19]. To our knowledge, no such methods have been implemented in groin hernia surgery, but it is evident that surgeons may potentially benefit from guidance in this area as they are already relying on various non-standardised estimates of physical growth in their decision-making.

This study has several strengths. The qualitative study approach produced an in-depth understanding of a sparsely studied topic told by those dealing with it first-hand. A pilot interview was performed to test the interview guide, and dedicated hernia specialists from both public and private hospitals nationwide were interviewed. Limitations include that interviews were conducted by phone, hence prohibiting the observation of body language and facial expressions. Furthermore, surgeons included in this study had performed a limited self-reported number of groin hernia repairs in adolescents, and detailed data on the surgeons' preferred operative approach were not collected. Lastly, the findings in this study reflect the considerations of a relatively small number of surgeons and may not be applicable to other surgeons. However, this is a limitation of interview studies in general.

Surgeons frequently emphasised the lack of guidelines, and this study uncovered a lack of consensus and uniformity among surgeons on the management of adolescents. A survey found that general and paediatric surgeons differed significantly in their surgical approach to adolescents [20]. This further highlights the need for increased research efforts and ultimately evidence-based guidelines to assist surgeons, which is challenging based on current data. The Danish Hernia Database only includes patients aged 18 years and above, whereas the Swedish Hernia Register includes patients aged 15 years and above. Databases like these provide unique and valuable prospectively collected data, and registering children and adolescents in these databases would greatly increase our knowledge of the management of groin hernias in these patients. Considering the low occurrence of groin hernias in adolescents [2, 3], it may possibly be favourable to manage these patients in dedicated hernia centres to ensure a consistent and standardised treatment.

CONCLUSIONS

This qualitative study found a lack of consensus and uniformity between surgeons on the management of groin hernias in adolescents. Surgeons had concerns about the use of mesh, differing opinions on watchful waiting and used a variety of non-standardised methods for evaluating physical growth. Lastly, this study found a desire among surgeons for further research on the topic, ultimately producing guidelines to assist them in their decision-making.

Correspondence *Hugin Reistrup*. E-mail: hugin.reistrup@gmail.com

Accepted 28 July 2023

Conflicts of interest none. Disclosure forms provided by the authors are available with the article at ugeskriftet.dk/dmj

Cite this as Dan Med J 2023;70(10):A02230121

REFERENCES

1. HerniaSurge Group. International guidelines for groin hernia management. Hernia. 2018;22(1):1-165.
2. Burcharth J, Liljekvist MS, Pommergaard HC, Rosenberg J. Cumulative incidence and registry validation of groin hernia repair in a 34-year nationwide cohort. Dan Med J. 2016;63(10):A5284.
3. Burcharth J, Pedersen M, Bisgaard T et al. Nationwide prevalence of groin hernia repair. PLoS One. 2013;8(1):e54367.
4. Bisgaard T, Kehlet H, Oehlenschlager J, Rosenberg J. Acceptable nationwide outcome after paediatric inguinal hernia repair. Hernia. 2014;18(3):325-31.
5. Olesen CS, Andresen K, Öberg S et al. Variations in open and laparoscopic repair of paediatric inguinal hernia. Dan Med J. 2020;67(4):A12190687.
6. Reistrup H, Fonnes S, Rosenberg J. Watchful waiting vs repair for asymptomatic or minimally symptomatic inguinal hernia in men: a systematic review. Hernia. 2021;25(5):1121-8.
7. Olesen CS, Mortensen LQ, Öberg S, Rosenberg J. Risk of incarceration in children with inguinal hernia: a systematic review. Hernia. 2019;23(2):245-54.
8. Olesen CS, Andresen K, Öberg S et al. Timing of inguinal hernia repair in children varies greatly among hernia surgeons. Dan Med J. 2020;68(1):A07200554.
9. Tong A, Sainsbury P, Craig J. Consolidated Criteria for Reporting Qualitative Research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care. 2007;19(6):349-57.
10. The Capital Region of Denmark. Which projects should I report? www.regionh.dk/til-fagfolk/forskning-og-innovation/de-regionale-videnskabsetiske-komiteer/sider/hvilke-projekter-skal-jeg-anmelde.aspx (22 Jun 2023).
11. World Medical Association. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. JAMA. 2013;310(20):2191-4.
12. Campbell S, Greenwood M, Prior S et al. Purposive sampling: complex or simple? Research case examples. J Res Nurs. 2020;25(8):652-61.
13. DeJonckheere M, Vaughn LM. Semistructured interviewing in primary care research: a balance of relationship and rigour. Fam Med Community Health. 2019;7(2):e000057.
14. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. Qual Health Res. 2005;15(9):1277-88.
15. Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. Nurse Educ Today. 2004;24(2):105-12.
16. Bay-Nielsen M, Nilsson E, Nordin P et al. Chronic pain after open mesh and sutured repair of indirect inguinal hernia in young males. Br J Surg. 2004;91(10):1372-6.
17. Öberg S, Andresen K, Klausen TW, Rosenberg J. Chronic pain after mesh versus nonmesh repair of inguinal hernias: a systematic review and a network meta-analysis of randomized controlled trials. Surgery. 2018;163(5):1151-9.
18. Haastrup E, Andresen K, Rosenberg J. Low reoperation rates in young males after sutured repair of indirect inguinal hernia: arguments for a tailored approach. Am J Surg. 2017;214(5):844-8.
19. Sanders JO, Qiu X, Lu X et al. The uniform pattern of growth and skeletal maturation during the human adolescent growth spurt. Sci Rep. 2017;7(1):16705.
20. Bruns NE, Glenn IC, McNinch NL et al. Treatment of routine adolescent inguinal hernia vastly differs between pediatric surgeons and general surgeons. Surg Endosc. 2017;31(2):912-6.