

Has Minimal Invasive Surgery Caused Alterations in Open Surgical Techniques?

Minimal Invaziv Cerrahi Açık Cerrahi Tekniklerde Değişikliğe Neden Oldu Mu?

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Abstract

Objectives: Some of the methods, which were routinely used in traditional open surgical techniques, have vanished nowadays as a result of technical and technological improvements. The aim of this study is to interrogate the responses of the surgeons who have different specialties but work on similar areas of the body to these technical alterations, and the feasibility of these methods in open surgery.

Materials and Methods: The study included 90 pediatric surgeons, urologists and general surgeons. A questionnaire was developed asking about the changes that the surgeons faced since first performing endoscopic surgery.

Results: The pediatric surgeons changed the accustomed surgical principles in six procedures (73%). Alterations of the urologists were in three pathologies (61%) and four pathologies (72%) in general surgeons. Eighty-six percent of pediatric surgeons, 27% of urologists and 40% of general surgeons were using these alterations of endoscopic techniques in open surgery as well.

Conclusion: In this study minimal invasive surgery (MIS) techniques have changed some of the accustomed surgical principles of open surgery. MIS were misevaluated as being close techniques to open surgeries, yet they are in fact a separate branch of surgery, which have many unique technical features. This approach may cause additional changes in open techniques by developing supportive and innovative aspects of MIS.

Key Words: Laparoscopy, Child, Surgery, Urology, General Surgery

Öz

Amaç: Geleneksel açık cerrahi tekniklerde rutin olarak kullanılan yöntemlerden bazıları, teknik ve teknolojik gelişmelerin bir sonucu olarak günümüzde ortadan kalkmıştır. Bu çalışmanın amacı, farklı uzmanlıklara sahip olan ancak vücudun benzer alanlarında çalışan cerrahların bu teknik değişikliklere verdikleri yanıtları ve bu yöntemlerin açık cerrahide uygulanabilirliğini sorgulamaktır.

Gereç ve Yöntem: Çalışmaya 90 çocuk cerrahi, ürolog ve genel cerrah dahil edildi. Cerrahların ilk endoskopik ameliyatı yaptıklarından bu yana karşılaştığı değişiklikleri sorgulayan bir anket geliştirildi.

Bulgular: Çocuk cerrahları, alışılmış cerrahi prensipleri altı girişimde (%73) değiştirdi. Ürologların üç (%61), genel cerrahlarda dört patolojide (%72) değişiklik yapıldığını belirtti. Sorgulandığında, çocuk cerrahlarının % 86'sı, ürologların %27'si ve genel cerrahların %40'ı artık açık cerrahide de bu endoskopik tekniklerdeki kullandıkları yöntemleri kullandığını söyledi.

Sonuç: Bu çalışmada minimal invaziv cerrahi (MIC) teknikleri açık cerrahinin alışılmış bazı cerrahi prensiplerini değiştirmiştir. MIC, açık tekniğin kapalı hali olarak değerlendirilmesi yanlış olacaktır. MIC açık cerrahiden farklı olan kendine özgü teknik özellikleri olan ayrı bir ameliyat tekniğidir. MIC, destekleyici ve yenilikçi yönlerini geliştirerek açık tekniklerde ek değişikliklere neden olabileceği görülmüştür.

Anahtar Kelimeler: Laparoskopi, Çocuk, Cerrahi, Üroloji, Genel Cerrahi

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Introduction

Surgery was founded on basic principles, and some operation techniques have not changed since they were first described. These methods have continued to be passed from master to apprentice for years. Bozzoni began modern endoscopy in 1805 with a reflective mirror, a double-lumen ventral cannula and a candle that was developed at the time and called a "Lichtleiter". In 1910 Jacobaeus entered the abdominal cavity and the term laparoscopy was used for the first time (1). After the Second World War the progression in laparoscopy was rapid, and minimal invasive surgery (MIS) began to be used in the abdominal, thoracic, and retroperitoneal areas (1,2). After 1960, a significant improvement was seen in MIS, and in the 90's it was popular with cholecystectomy, appendectomy and splenectomy operations. Afterwards, it became the gold standard, especially in cholecystectomy, splenectomy and fundoplication. Experienced surgeons in the course of time confirmed the benefits of endoscopic surgery, and it was adopted rapidly by a new-generation young surgeons. After widespread medical meetings and courses, general surgeons, urologists, gynecologists and pediatric surgeons who are predisposed to endoscopic procedures started to perform endoscopic operations in universities and research-training hospitals. In the present study we aimed to evaluate the alterations of accustomed surgical principles after clinic practice of endoscopic surgery procedures that was applied most frequently in pediatric surgery, general surgery and urology and also usage of these procedures in open surgery as well.

Materials and Methods

We initiated an observational study by sending a questionnaire to 90 surgeons who were with at least 5 years experience in MIS as applied to pediatric surgery, urology and general surgery. Each group consisted of 30 surgeons who answered questions regarding the change of the accustomed surgical principles after performing endoscopic surgeries in daily practice. Additionally, the survey was intended to obtain demographic data and ascertain which were the most frequently performed procedures in each branch.

Results

In pediatric surgery a group was assembled from eighteen centers, the median age was 47 (28-62 years) and 76% (23/30) of participants were male. The mean length of time in practice was 16 years, with 9.6 years in endoscopic surgery. Seventy five percent (6/8) of the practitioners in pediatric surgery changed the accustomed surgical principles (Table 1).

Regarding undescended testicles, 100% (23/23) of practitioners were repairing inguinal canal in open surgery whereas 26% (6/26) of them were repairing in laparoscopic surgery. Twelve out of thirty pediatric surgeons (40%) were burying the remaining end of the appendix in open appendectomy, whereas none of them were burying in laparoscopic appendectomy. Seventeen of the surgeons (56%) were tie up the remaining end twice in laparotomy, on the other hand three of those reported using a single knot in laparoscopy. Only one of the eighteen surgeons were doing intestinal reduction from proximal to distal in open surgery whereas the others were performing to distal to proximal. Twenty-one surgeons out of one (95%) in laparotomy and eight (36%) in laparoscopic splenectomy reported separate dissection of splenic vessels. Nine of them performed artery and vein dissection primarily in laparotomy and 16 surgeons isolate vessels at the end of the laparoscopic operation. Nineteen of the surgeons out of one who perform varicocelelectomy declared vein ligation after isolation of artery and veins (95%) and nine of them were doing the same (47%) in laparoscopy. Laparoscopic meso-intestinal operations were performed by eleven of surgeons and only one of them was ligating the mesocolon, and the others (91%) were using unipolar and bipolar cauterization. Four (36%) of the surgeons who were isolating mesentery with other techniques in laparoscopy reported dissection with ligation in laparotomy.

In the urology group taken from eighteen centers, the median age was 36 (21-51 years), and 96% (29/30) of participants were male. The mean length of time in practices and endoscopic surgery were 7.2 years. Sixty one percent of

Table 1: Changed the accustomed surgical principles in pediatric surgery

Pediatric surgery		Accustomed surgical principles
Laparoscopic hernia repair	Hernia sac excision	No
Nonpalpable testis	Inguinal canal repair	Yes
Laparoscopic appendectomy	Burying stump	Yes
	Mesoplasty/omentoplasty	No
	Number of stump ligation	Yes
Laparoscopic intussusception reduction	Pulling the intestines proximally and distally	Yes
Laparoscopic splenectomy	End-bloc ligation	Yes
	Priority of vascular hilus	Yes
Laparoscopic nephrectomy	End-bloc ligation	No
	Priority of vascular hilus	No
Laparoscopic varicocele ligation	End-bloc ligation	Yes
Laparoscopic anastomosis	Manual control of intestinal passage	No
	Devices other than ligation for mesenteric dissection	Yes

the practitioners of urology changed the accustomed surgical principles in three of the five operations (Table 2). One of the five different techniques that were asked about to urologists in the questionnaire was the laparoscopic hernia operation. Five out of the eight (62%) who perform laparoscopic hernioplasty reported hernia sac resection in open surgery, and only one (20%) of them doing the same in laparoscopy. Three of the 19 urologists (15%) who performed laparoscopic orchidopexy reported inguinal canal repair in laparoscopic procedures. The laparoscopic meso-intestinal operations were performed by 14 surgeons and they reported ligation in laparotomy and unipolar, bipolar cauterization in laparoscopy.

In the general surgeon group, the median age was 38 (30-56 years) and 93% (28/30) of participants were male from sixteen centers. The mean length of time in practice was 9.1 years and

Table 2: Changed the accustomed surgical principles in urology

Urology		Accustomed surgical principles
Laparoscopic hernia repair	Hernia sac excision	Yes
Nonpalpable testis	Inguinal canal repair	Yes
Laparoscopic nephrectomy	End-bloc ligation	No
	Priority of vascular hilus	No
Laparoscopic varicocele ligation	End-bloc ligation	No
Laparoscopic anastomosis	Manual control of intestinal passage	No
	Devices other than ligation for mesointestine	Yes

Table 3: Changed the accustomed surgical principles in general surgery

General surgery		Accustomed surgical principles
Laparoscopic hernia repair	Hernia sac excision	Yes
	Anterior or posterior approach	Yes
Laparoscopic appendectomy	Burying stump	Yes
	Mesoplasty/ omentoplasty	No
	Number of stump ligation	Yes
Laparoscopic splenectomy	End-bloc ligation	No
	Priority of vascular hilus	No
Laparoscopic anastomosis	Manual control of intestinal passage	No
	Devices other than ligation for mesenteric dissection	Yes
Laparoscopic colon resection	Approaching order (Medial to lateral)	Yes

4.2 years in endoscopic surgery. Seventy two percent of the practitioners changed the accustomed surgical principles in four of five operations in general surgery (Table 3).

Nine out of 21 (43%) surgeons who perform laparoscopic hernioplasty reported hernia sac resection in open surgery. Five out of 21 (24%) surgeons were resecting the sac in laparoscopy. Only three surgeons preferred approach in laparoscopic surgery where as open surgery. Eighteen (70%) of the 26 surgeons who were performing laparoscopic appendectomy burying the remaining end of appendix in laparotomy, and three (12%) did so in laparoscopy. Six of the 12 surgeons performing laparoscopic meso-intestinal operations reported ligation in laparotomy, and five of these were using unipolar or bipolar cauterization in laparoscopy. In laparotomy, 12 surgeons changed from lateral-medial dissection technique to medial-lateral as the necessity of laparoscopy when performing cancer surgery on the colon.

The usages of the endoscopic surgery techniques in open surgery were queried. Eighty six percent of pediatric surgeons, 27% of urologists and 40% of general surgeons reported that the technique was applied even when the operation was performed as open surgery. The mean change in accustomed principles of surgery was half as much as was expected, showing a level of 51%. Forty-nine percent of the participants were queried concerning the reasons why endoscopic surgery technique was changed and not applied when the operation was open surgery. The reasons given for not applying the procedures in open surgery were rituals of habit (74%), safety (10%), easiness (10%), to be fast in open surgery (2%), experienced in open procedure (2%), not feasible in endoscopic surgery (2%).

Discussion

In the current study, the change of some accustomed surgical principles of open surgery by endoscopic surgeons was demonstrated. Eighty- six percent of pediatric surgeons, 27% of urologists and 40% of general surgeons reported that the principle of the surgical technique, which was changed by endoscopic surgery, has also been performed in open surgery as well. It was observed that accustomed surgical principles were changed in all branches at different rates (51%). However, this ratio may vary according to the number, age and experience of the surgeons, and in different centers and countries. The reason for these differences between the branches may be the result of training differences during residency. In a recent study it was reported that the vast majority of residents (74%) have access to conventional urologic laparoscopy in their departments whereas this rate in USA is about 100% (3). Although urologic laparoscopy is available in almost every training center, most of them consider their laparoscopic experience to be low. In the same study only 23% of the residents rated their laparoscopic

experience as at least 'satisfactory' (3). In a broad literature survey we couldn't find a study evaluating these rates thoroughly in Turkey. The current study evaluated three branches of surgery in three groups with equal participants and from approximately similar training centers. However, it is not clear whether or not endoscopic surgeons have enough and sufficient uniform training.

Furriel et al. (3) reported that general surgery training includes basic laparoscopic procedures with a sufficient number of cases; however advanced laparoscopy experiences may be limited. On the other hand, urology residents have different learning curves due to the lack of basic surgical procedures. De Win et al. (4) reported that 47.9% of urology respondents, 66.7% of general surgery respondents, and 69.2% of gynecology respondents had a surgical skills lab training that included laparoscopy within their training hospital or university. Although the study was from a different country, their results resemble ours and this may be the reason why urologists are more inclined towards conservative management.

While general surgeons mostly deal with abdominal surgery and urologist's mostly deal with urinary system, pediatric surgeons deal with more systems such as the thorax, abdomen and genitourinary. It may be as a result of dealing with different systems that surgeons must be aware of the different disciplines. It is also reported that pediatric surgery has common dominant procedures to build upon MIS such as appendectomy, pyloric stenosis and fundoplication (5).

It is not easy every time to explain the reasons for not changing the accustomed surgical principles. Previous training programmes and adult learning difficulties might be some other reasons why 49% of the surgeons reported were resistant to applying the procedures. The reasons given for not applying the procedures in open surgery were rituals of habit (74%), safety (10%), easiness (10%), to be fast in open surgery (2%), experienced in open procedure (2%), not feasible in endoscopic surgery (2%).

Older age can be a reason for prejudice and resistant to learning (5). Additionally one other reason might be a factor; although experienced surgeons have training in laparoscopy, they might not be capable enough to apply laparoscopy. Moreover, they may think themselves sufficiently experienced in open surgery, and this may prevent them from learning new knowledge. By this time, minds may be tempted to shut out new ideas and different ways of thinking. Mental habits, accustomed description and presuppositions could develop in this way (6). Most of the time; adults want to get positive feedback. There may be also personnel concerns, a need to be in safe zone to protect their self-reliance. On the other hand, the variation seen in the study (51%) can be explained by the presence of surgeons

who have enthusiasm or more prone to the developing science of medicine.

Adults learn differently from young people. They have special needs as learners and these needs should be taken into consideration when planning teaching for adults. In 1970, the "andragogy" term was reported by Malcolm Knowles, a term describing the differences between children and adult learners (7). Andragogy focuses on the special needs of adult learners with six assumptions about adult learning: need to know, self-concept, prior experience, readiness to learn, learning orientation and motivation to learn (7). In this study most of the differences in learning and appliament of the knowledge may be explained by the andragogic approach.

Until the 1990's laparotomy was the usual approach to abdominal pathologies, and this was nearly replaced by laparoscopy in 1990's (8). This minimal invasive technique offers many benefits to patients in terms of cosmetic, less postoperative pain, short hospital-stay, and quick return to daily activities (4). However, endoscopic procedures require different surgical competencies and skills from open surgery (2,3,9,10). The development of expertise in surgical technique (psychomotor skills) must parallel the acquisition of knowledge (cognition) and professional attitudes and ethics (personality) (11).

Surgeon training and resistance to change (Middle age syndrome), lack of patient awareness, lack of incentives for surgeons, lack of doctor awareness and referral patterns, complications, stress factors, cost factors, the health insurance sector which is still not fully evolved in third world and the learning curve are the main factors that prevent improvements in MIS (8). Additionally those same challenges may affect new era surgical procedures of single incision laparoscopic surgery and robotic surgery.

Although MIS has not had enough history and publications like open surgery, it provides shorter operations and hospital stays, better cosmetic results and fewer complications than open surgery, and the changing of the accustomed surgical principles will increase by the time when the literature expands.

Higher percentage in pediatric surgery, some accustomed principles of open surgery observed to be left. Young surgeons are inclined to learn more quickly, older ones are eager to update their experience demonstrating that surgeons are ready to for innovations and addicted to previous routines.

Conclusion

In this study MIS techniques have changed some of the accustomed surgical principles of open surgery. MIS were misevaluated as being close techniques to open surgeries, yet

they are in fact a separate branch of surgery, which have many unique technical features. This approach may cause additional changes in open surgical techniques by developing supportive and innovative aspects of MIS.

Ethics

Ethics Committee Approval: No patients were used in the study. It is a survey. Therefore, there is no need to get approval from the ethics committee.

Informed Consent: No patients were used in the study. Since, informed consent form were not obtained.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: G.G., G.K., Concept: M.Ç., Design: M.Ç., Data Collection or Processing: G.K., O.T., F.K., Analysis or Interpretation: G.G., G.K., O.T., F.K., M.Ç., Literature Search: O.T., F.K., Writing: G.G., G.K.

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