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Does The Trocar Type Affect The Complication Rate In Endoscopic Surgery?

Endoskopik Cerrahide Kullanılan Trokar Tipleri Komplikasyon Oranlarını Etkiler mi?

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ABSTRACT

Aim: Sharp and blunt trocars are two types of trocars that are used in laparoscopy and there are some advantages and disadvantages when they are compared each other. In this study, we aimed to research into the relationship between the complication rates and trocar types.

Material and Methods: In this retrospective study, we evaluated that data of laparascopic cases performed in our clinic obtained from electronic patient record system.

Findings: The data of 226 patients were evaluated (pyramidal cutting (sharp), n: 97; conic (blunt), n:129). According to the types of trocars applied on patients, there were no difference in terms of age, Body Mass Index (BMI), hospitalization duration and hemoglobin changes. A statistically insignificant difference was found on operation time. (pyramidal cutting: 106,7±35,7; conic blunt 101,6±38,2, P:0,17). On the other hand, epigastric artery injury (pyramidal cutting: 0,10±0,3; conic blunt: 0,00±0,00; P:0,00), blood transfusion requirement (pyramidal cutting: 0,09±0,2; conic blunt: 0,04±0,2, P: 0,01) and requirement for analgesics (pyramidal cutting: 2,8±1,8; conic blunt: 2,2±1,2; P: 0,001) were determined to be significantly more in those operations that pyramidal cutting trocars were used.

Conclusion: In our study, it was determined that the epigastric artery injury in the second port entry in particular might be associated with the pyramidal cutting-tip trocars.

Keywords: Complication, laparoscopy, types of trocars, vascular injury

ÖZ

Amaç: Laparoskopide kullanılan keskin ve künt uçlu trokar tiplerinin birbirlerine göre avantaj ve dezavantajları vardır. Çalışmamızda komplikasyon oranları ile trokar tipleri arasındaki ilişkiyi araştırmayı amaçladık.

Gereç ve Yöntemler: Retrospektif olarak elektronik hasta kayıt sisteminden kliniğimizde yapılan laparoskopi vakalarının verileri incelendi.

Bulgular: Toplam 226 hastanın verileri değerlendirildi (piramidal keskin, n: 97; konik künt, n:129). Hastalarda kullanılan trokar tiplerine göre yaş, BMI, hospitalizasyon süresi ve hemoglobin değişiklikleri açısından fark izlenmedi. Operasyon süresinde istatistiksel olarak anlamlı olmayan fark izlendi (piramidal keskin: 106,7±35,7; konik künt 101,6±38,2, P:0,17). Epigastrik arter yaralanması (piramidal keskin: 0,10±0,3; konik künt: 0,00±0,00; P:0,00), kan transfüzyon ihtiyacı (piramidal keskin: 0,09±0,2; konik künt: 0,04±0,2, P: 0,01) ve analjezik ihtiyacının (piramidal keskin: 2,8±1,8; konik künt 2,2±1,2; P: 0,001) ise piramidal keskin trokar kullanılanlarda anlamlı olarak fazla olduğu saptandı.

Sonuç: Piramidal keskin uçlu trokarlar daha fazla doku hasarı ve vasküler yaralanmaya yol açmaktadırlar. Çalışmamızda özellikle ikinci port girişinde epigastrik arter yaralanmasının piramidal keskin uçlu trokarlarla doğrudan ilişkili olduğu saptandı.

Anahtar Kelimeler: Komplikasyon, laparoskopi, trokar tipleri, vaskülar yaralanma

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Introduction

Although the primary application of endoscopic surgery dates back to 80 years or so, it has gained acceleration, particularly from the beginning of 1990s onwards. The first laparoscopic hysterectomy was performed in 1989, with the advancement of tools and technology (1). In the following years, the endoscopic methods which also came into use in gynecologic oncologic operations generate the great majority of gynecologic operations in many countries today. The increasing use of laparoscopy, including the oncological surgical procedures, necessitates the revision of devices.

Although some publications indicate that laparoscopy provides a more rapid recovery and less hospitalization by causing less pain when compared with laparotomy, length of the training period and requirement of complicated devices are restrictions of laparoscopic surgery (2). And even though it has fewer complications than laparotomy, it leads to major complications with a high mortality rate (3). Metaanalyses and large multicenter studies have provided pooled risks of vascular and bowel injury at the time of laparoscopic entry as 0.2 per 1.000 and 0.4 per 1.000, respectively (4).

More than 50% of the complications in laparoscopy take place in the process of the initial entry into the abdomen (5). So various initial entry techniques and modern equipments have been developed to avoid any complications. But according to current evidence, no one laparoscopic entry methods and trocar types have demonstared clear superiority over another (6).

In our study, we compared the cases of laparoscopy performed in our clinic in terms of the operation period, vascular injuries, hemogram change, blood transfusion requirement, requirement for analgesics and hospitalization period according to the types of trocars used.

Material and Methods

In our study, we evaluated the data of 226 patients who underwent a laparoscopic surgery performed with various indications during the period of assistant training done under the guidance of the same surgeon in Izmir Katip Çelebi University, Ataturk Training and Research Hospital, The Clinic of Obstetrics and Gynecology between July 2011 and June 2014.

Our study is a retrospective data analysis, and the necessary approval has been received from The Ethical Committee of Izmir Katip Celebi University, Medical Faculty. The patients' age, Body Mass Index (BMI), indication of the operation and the performed operation, operation period, the pre-operative and post-operative hemoglobin values at the 12th hour, the developing complications, requirement for analgesics and hospitalization periods were evaluated through the data recorded within the electronic data record system of the patients.

Statistics

In the evaluation of the data, the Statistical Package for Social Sciences (SPSS) software (SPSS 20.0 version for Windows, SPSS Inc, Chicago, USA) was used. The mean ± standard deviation values were used for perpetual variables. In the comparative data, the Student T Test was used. The categorical variables were assessed through the Chi Square Test and were expressed as a numerical value and %. The $P<0.05$ value was regarded as significant.

Results

The data of a total of 226 patients were achieved. The age range of the patients was between 15 and 73, and it was determined that the average age as 34,9 years while BMI was 25,9 kg/m^2 The types of the operations and their distribution according to the types of trocars used were shown in Table 1. It was ascertained that a pyramidal-tip trocar (the trocar with a pyramidal tip) was used for 97 of the patients, whereas a conic-tip trocar was used for 129 of the patients (Figure 1). No difference was found among the age, BMI, operation period, hemoglobin change and hospitalization duration of the patients on whom pyramidal and conic-tip trocars were used ($p>0.05$). It was determined that there were more requirement of blood transfusion and analgesics of the patients in pyramidal-tip trocar used operations, and the difference was found to be statistically significant ($p<0.05$). We found out that 11 of our patients had epigastric artery injuries in the second port entry and all of them occurred in the patients on whom cutting-tip trocars were used ($p=0.00$,). Our findings are summarized in Table 2.

Figure 1: Type of trocars.

A: Conic blunt trocar, B: Pyramidal cutting trocar

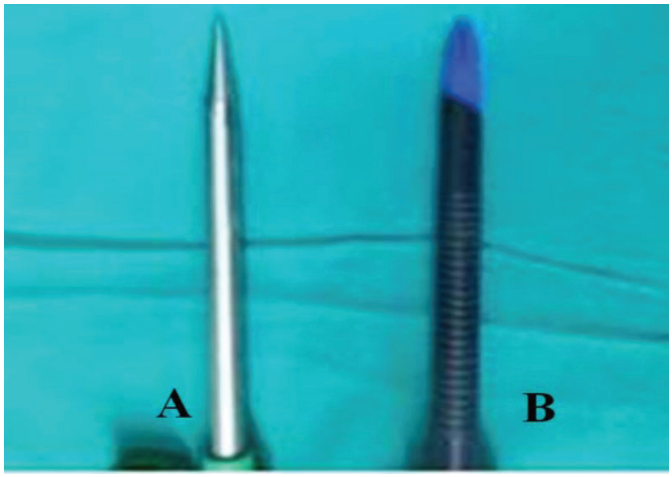

Table 1: The distribution of the cases according to the types of trocars.

Operation	Type of trocar		Total	Percentage
	Conic blunt	Pyramidal cutting		%
Tuba ligation	23	12	35	15.5
Cystectomy	47	37	84	37.2
TLH/LAVH	20	15	35	15.5
Endometriosis	18	17	35	15.5
Ectopic pregnancy	19	9	28	12.4
Diagnostic laparoscopy	2	7	9	4
Total	129	97	226	100

Table 2: The distribution of the data according to the types of trocars

Parameters	Pyramidal cutting	Conic blunt	P
Blood transfusion (unit)	0.09±0.2	0.04±0.2	0.01
Hospitalization period (day)	1.98±1.32	1.91±1.18	0.14
Hb. changing value (g/dl)	1.7±0.98	1.9±1.0	0.96
Operation period (min)	106.7±35.7	101.6±38.2	0.17
Epigastric artery injury	0.10±0.3	0.00±0.00	0.00
Requirement for Analgesics (dose)	2.8±1.8	2.2±1.2	0.001

Discussion

This retrospective study shows that the use of trocars with different types of tips in laparoscopic surgeries did not have a significant relevance on the hospitalization duration, decrease in hemoglobin values and the operation duration. It was determined that in the patients on whom cutting-tip trocars were used,there were more epigastric artery injury in the second port entry and further requirement for blood transfusion and analgesics.It is stated that the most common minor vascular injury in laparoscopic surgeries is the epigastric artery injury.In a study the rate of epigastric artery injuries seen in the course of hernia repair was reported to be 76 (0,7%) in 10837 cases, which was considered to be due to various factors, such as the experience of the surgeon, a blunt tip of the trocar, and the insufficiency in stabilizing the abdominal wall (5).

In our study, the rate of the epigastric artery injury was determined to be 4,5%, and all of these cases were seen in the patients on whom cutting-tip trocars were used and this injuries wasn't correlated with BMI. There were proportionally more epigastric artery injuries compared to those in the previous studies was considered to be due to the fact that all the operations took place during the research assistant trainig-curve process. In an empirical study where the effects of the types of trocars on bleeding were examined, it is pointed out that the use of conic blunt-tip trocar causes less vascular damage. In this study, it was not clearly stated if which one of the major or minor vascular injury is the factor that causes bleeding. And also, in this study, even though cutting-tip trocars are particularly used for the applications in the midline which is known as the avascular region, the use of blunt-tip trocars are recommended for the applications on the lateral section, known as the vascular region (6).

As the result of our study, we ascertained that all the epigastric injuries prominently in the use of cutting-tip trocars occurred, as opposed to the unclear numerical values in the other studies. In our study, it was determined that there was significantly more requirement for blood transfusion in the patients on whom cutting trocars with pyramidal tips were used. We considered that this difference did not only result from the epigastric artery injury but that it was due to the different types of operations performed on the patients and difference between preoperative hemogram values of the patients.

Moreover, in our study, it was determined that there was less requirement for analgesics in the patients on whom conic-tip trocars were used. In other similar studies, it has also been reported that there was less requirement for analgesics in the use of conic blunt trocars, and the reason for this was stated to be due to the fact that it caused less damage in the abdominal wall, which, therefore, necessitated no suture in general (7).

In a randomized controlled trial have demonstrated less postoperative pain and more patient satisfaction with the radially expanding device than with the conventional trocar entry techniques (8). In our study, the analgesic doses administered to the patients were acquired from the records.

In our study, we found out that the operation duration in the patients on whom pyramidal-tip trocars were used lasted more than five minutes on the average. We assumed that this difference was statistically insignificant and was probably associated with the period of fascial closure. Also in the other conducted study, it is reported that the operation period, in a similar way, lasted longer in the patients on whom cutting pyramidal trocarswere used (8).

Our study, being a retrospective one and involving inhomogeneity in the distribution of the diversities of operations, may seem to lack several aspects; yet, the fact that all the cases were performed by the same surgeon and all the records were obtained from the electronic platform besides the great number of cases involved in the study can be considered as the substantial factors within.

Conclusion

The port entry bleedings may be the reason for the potential secondary operation. In consequence of our study, we ascertained that the epigastric artery injuries were prominently less seen in the use of conic blunt-tip trocars on the vascular regions in particular. Though our study may set an example for the prospective ones, in our opinion, further prospective and randomized blind studies comprising more number of cases are required in regard to this subject.

Conflict of interest statement

The authors declare no conflict of interest.

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