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## Experience – the key factor in successful laparoscopic total extraperitoneal and transabdominal preperitoneal hernia repair

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**Abstract** To emphasize the importance of the experience of the operating team, we compared the two largest materials in the total extraperitoneal (TEP) and the transabdominal preperitoneal (TAPP) procedures in Poland. We performed 1225 procedures on 1110 patients (368 TEP and 809 TAPP). The experience of the operating teams measured by the mean number of procedures/surgeon was comparable. The mean operating time and hospitalization duration did not differ markedly. There was no procedure-related mortality. Intraoperative complications were infrequent. The ratio of early local complication (neuralgia, hematoma, and seroma) was slightly higher in the TEP group. We observed a higher recurrence rate following the TAPP procedure (2.84% vs 1.92%). However, after excluding the learning period this dropped markedly to much lower, comparable values (TEP: 0.98%; TAPP: 1.14%). In laparoscopic hernia repair the experience of the operating team seems to be more important than choice of technique (TEP vs TAPP).

**Keywords** Laparoscopy · Hernia · TEP · TAPP

### Introduction

Probably no other disease entity could be treated with so many different procedures as groin hernia. This abundance of solutions to only one problem might be attributed to the fact that probably no one of them is

unquestionably superior to the others. On the other hand, even well-documented results of numerous studies comparing different techniques of herniorrhaphy have very little, if any, impact on everyday clinical practice. Personal belief in and experience of the technique currently used still seem to be more important. This factor is very difficult to measure, standardize and compare; however, it has a very important influence on the results. This is probably why data reported by specialized centers are very difficult to reproduce.

Even the most perfectly constructed, prospectively randomized trials usually do not allow for the comparison of surgical teams with similar experience and personal belief that the method offered by them gives the best results. In designing this study we selected two hospitals with the most extensive and comparable experience in two different methods of laparoscopic hernia repair – the transabdominal preperitoneal (TAPP) and total extraperitoneal (TEP) procedures – in Poland. Surgeons from those centers know both techniques well. However, they are convinced that the results of the procedure used by them as the primary method, either TAPP or TEP, are best in their hands.

### Patients and method

#### Method

A retrospective analysis was conducted of the two largest series in TAPP and TEP in Poland from two different centers. In the 2nd Department of General Surgery, Collegium Medicum of the Jagiellonian University in Krakow, the TAPP method is used as the primary technique of endoscopic hernia repair. In the Department of General Surgery of the District Hospital in Szczecin only the TEP repair is performed. In both hospitals the choice of the technique of herniorrhaphy reflects the personal belief in it based on many years of experience.

Both materials were compared with special regard for parameters such as operating time, duration of hospitalization, and early and late complication rates, including recurrences. The learning period was defined as less than 20 herniorrhaphies per surgeon experienced in other laparoscopic procedures (more than 50).

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## Technique

In the 2nd Department of General Surgery, Collegium Medicum of the Jagiellonian University in Krakow, at the beginning (since January 1993) we used our own modification of the TAPP procedure with limited tissue dissection and small mesh covering only existing, visible defects in the groin area. Unfortunately, we noticed an unacceptably high recurrence rate among patients operated on using this technique. In June 1995 we modified it: the tissue dissection became more extensive and a larger area of the groin was exposed and covered with larger mesh (10×15 cm). In every case the mesh with an incision on the longer edge was introduced under the spermatic duct.

At the Department of General Surgery of the District Hospital in Szczecin the same technique has been used from the beginning (May 1995) until now. The working space is created by a blunt dissection without a balloon. A mesh 10×15 cm large is positioned over the groin area and secured with clips. The mesh has no incision for the spermatic cord.

## Patients

Until June 1999 we performed 1225 operations for groin hernia on 1110 patients. There were 809 intraperitoneal (TAPP) and 416 extraperitoneal (TEP) repairs. Apart from the sex distribution, the two groups of patients were comparable. Patients data are given in Table 1.

## Results

There was no mortality related to the procedure. We encountered one injury of the external iliac artery during the insertion of the trocar in the TEP group. The patient underwent vascular reconstruction with Goretex graft and is now symptom free. There were three transections of the inferior epigastric artery in the TAPP group. In two cases the vessel was clipped laparoscopically; one required open hemostasis through a small inguinal incision.

Early postoperative complications were more frequent in the TEP group. However, most complications in both groups were self-resolving or required only medical treatment. The differences in the complication ratio were statistically insignificant.

Follow-up examinations were performed by the members of the operating team. The period of follow-up

before examination ranged from 6 to 76 months (mean 42.5 months) in the TAPP and 6–47 months (mean 23.8 months) in the TEP group. In the TAPP group 83.5% and in the TEP group 78.6% of patients were submitted to this examination. There were 23 recurrences (2.84%) after intraperitoneal and 8 (1.92%) after extraperitoneal repair. All recurrences were observed from 10 days to 1 year after the operation. In both groups most relapses were encountered during the learning period, and usually at the beginning of it. In TAPP most recurrences came from a period when we used a small mesh covering only a visible defect in the groin. In TEP four of eight recurrences appeared among the first ten patients. After the learning period the recurrence rate dropped markedly (TEP: 0.98%; TAPP: 1.14%). All differences in recurrence rates were statistically insignificant.

Twelve recurrences after TAPP were repaired laparoscopically with good results. Two patients underwent open (Lichtenstein) repair. Six of the recurrences were the result of the use of too small mesh. The mesh covered the previously repaired defect properly while a new defect had developed in the vicinity. In the remaining eight patients the recurrence resulted from displacement or rolling of the mesh. Nine patients with a small palpable recurrent hernia on physical examination refused any further treatment. Despite an obvious relapse they believed that their problem was markedly improved by the operation because the recurrence was much smaller than the primary hernia.

In the TEP group the first two recurrences were repaired with the Bassini and the remaining six with the Lichtenstein technique. The results of these procedures were very good. In all patients rolling or displacement of the mesh was the cause of recurrence.

Detailed data comparing both procedures are given in Table 2.

## Discussion

In the 1990s – an era of rapid development of laparoscopy – many new techniques of herniorrhaphy based on

**Table 1** Material of transabdominal preperitoneal (TAPP) and total extraperitoneal (TEP) hernia repair

	TAPP	TEP
Hospital	2nd Department of General Surgery, Collegium Medicum of the Jagiellonian University	Department of General Surgery of the District Hospital in Szczecin
Surgeons performing endoscopic hernia repair	5	2
Mean number of procedures per surgeon	163.2	184
Number of patients	742	368
Age	15–84 years (mean 48)	21–82 years (mean 51)
male:female	597:145	364:4
Number of repaired hernias	809	416
Indirect	487 (60.2%)	231 (55.5%)
Direct	166 (20.5%)	102 (24.5%)
Femoral	4 (0.5%)	1 (0.2%)
Recurrent	69 (8.5%)	34 (8.2%)
Bilateral	83 (10.3%)	48 (11.5%)

**Table 2** Results of laparoscopic hernia repair. *TAPP* transabdominal preperitoneal hernia repair, *TEP* total extraperitoneal hernia repair

	TAPP	TEP
Mean operating time	41 min (25–95)	46 min (15–275)
Hospitalization duration	2.2 days	1.7 days
Intraoperative complications	3	1
Transection of the inferior epigastric artery	3	0
Perforation of external iliac artery	0	1
Postoperative complications	89 (11%)	67 (16.1%)
Groin haematoma or seroma	56 (6.9%)	39 (9.4%)
Groin pain or hyperesthesia	10 (1.2%)	2 (0.5%)
Testicular pain or edema	23 (2.8%)	26 (6.2%)
Overall recurrences	23 (2.84%)	8 (1.92%)
Recurrences (learning period excluded)	7 (1.14%)	4 (0.98%)

the principle of minimally invasive access emerged. However, laparoscopic hernia repair, despite some enthusiastic reports, did not repeat the success of laparoscopic cholecystectomy. Even though laparoscopic repair of hernia is frequently regarded as equivalent to classical techniques, it has not been used widely [6, 10]. Several factors account for that. The procedure is technically more demanding than the open inguinal operation, and it must be performed under general anesthesia. The cost of instruments, mesh, and clip appliers is another important drawback. However, excellent early results, a low complication rate, and a smooth, nearly painless postoperative course are very encouraging, and in many centers specializing in laparoscopic surgery these procedures are common [6, 9].

Continuous efforts to simplify the operation, improve safety and reduce the recurrence rate resulted in the evolution and numerous modifications to laparoscopic hernia repair. Two basic techniques are currently in use: TAPP, the transabdominal preperitoneal procedure and TEP, the totally extraperitoneal procedure [2].

The concept of TEP and TAPP repair is generally the same. In both techniques the groin area is reinforced with the mesh that is implanted in the same anatomical region [7]. The principles regarding the extent of dissection in the groin, size of the mesh, its positioning and securing are currently basically the same. The only difference is the access to the operating field. In the TEP method the whole procedure is performed in the extraperitoneal space without opening the peritoneum. It is believed that this could decrease the rate of complications resulting from intraperitoneal operation [3]. However, some surgeons have argued the point of more extensive dissection, which is contrary to the concept of minimal invasiveness and which might contribute to a higher local complication rate [5]. On the other hand, TAPP seems more difficult and risky as the whole procedure is performed in the vicinity of the intestine and large vessels that are more prone to injuries [11]. These theoretical debates have not been proven unequivocally in clinical trials.

There are numerous studies comparing the two techniques; however, most of them do not allow for a conclusion to be reached as to whether one is undoubtedly superior to the other [1, 3, 4, 5, 8, 10, 12]. Some of them fulfill the criteria of prospective randomized trials. Obviously, a random selection allows for the choice of possibly the most comparable groups for further study. However, it is nearly impossible to train two operating teams equally experienced in the use of both techniques. To achieve good, convincing results in the repair, a substantial learning period is required. The most reliable data come from the centers with extensive experience. In those reports a very smooth, nearly painless postoperative period and a limited number of early postoperative complications compensate for most disadvantages of the method. The late results, especially the recurrence rate, appear to be no different than those achieved with the use of open techniques [3, 6, 9, 10]. It seems obvious that for the achievement of good results the role of experience in the use of the technique cannot be overestimated. Another important factor which is difficult to measure and compare is the personal belief that the method used by the surgeon is the best and most reliable. In most studies comparing TEP and TAPP, one technique is used for a longer period of time whereas the other only occasionally – or it is introduced shortly before the trial. In the design of this study we wanted at first to eliminate the differences in experience of the operating teams. We believe that this factor is crucial for the results of surgery, and to emphasize its role we have selected two largest materials in TEP and TAPP in Poland. Surgeons from both hospitals are very skilled in laparoscopy, not only hernia repair, and use their method in preference to others. The choice of the technique reflects the belief and knowledge of the operating team that they offer their patients the method that gives the best results. Experience measured by the number of procedures/surgeon was comparable and certainly the highest in our country. This study design does not allow for a perfect match of patient groups; however, in retrospective analysis they seem comparable.

As in many other studies we were not able to prove that any of the compared methods is superior to the other. We did not observe any problems resulting from the opening of the peritoneum. Moreover, the only serious intraoperative complication (injury of the iliac artery) was encountered in the TEP group. On the other hand, our results do not support the thesis that TAPP should be preferred in cases of bilateral or recurrent hernias. The ratio of those patients was even slightly higher in the TEP group. Though neither bilateral nor recurrent hernia should be regarded as the limitation on the extraperitoneal procedure, which is suggested by some authors.

In the evaluation of the results of hernia repair the recurrence rate seems to be the most important endpoint. In both groups we were able to clearly define the learning period when the recurrence rate was markedly higher. We observed slightly more recurrences after

TAPP. However, this difference was statistically insignificant and the follow-up was longer in this group, so we may expect that in a comparable period of time this difference should disappear.

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## Conclusion

The study did not allow us to draw the conclusion that one method of endoscopic hernia repair (TEP or TAPP) is superior to the other. For the achievement of good, replicable results, the experience of the operating team seems more important than the selection of the technique of laparoscopic hernia repair.

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