

СРАВНИТЕЛЬНАЯ ЭФФЕКТИВНОСТЬ УШИВАНИЯ СЕТЧАТЫМ ИМПЛАНТОМ ДЕФЕКТА ПОЧКИ ПОСЛЕ РЕЗЕКЦИИ НА МОДЕЛЯХ СВИНЕЙ

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Цель. Улучшение качества выполнения резекции почки. **Материалы и методы.** На моделях свиней проведено 50 лапароскопических резекций почек. В 25 случаях резекция проводилась по стандартной методике гемостаза ложа резекции почки с применением П-образных гемостатических швов викрил 3-0. В 25 случаях ложе резекции почки ушивалось по авторской методике гемостаза ложа резекции почки с применением полипропиленовой сетки. **Результаты.** Среднее время операции было сопоставимо в группах сравнения, интраоперационная кровопотеря была ниже на 30% в группе моделей свиней, оперированных с применением проленового импланта. Среднее соотношение веса резецированной почки с контралатеральной почкой в процентах был 77,3% после классической резекции почки и 85,6% после резекции с применением проленового импланта. **Заключение.** Лапароскопическая резекция почки с применением сетчатого импланта – эффективный способ выполнения резекции почки, обеспечивающий качественный гемостаз при меньшей травматизации здоровой почечной паренхимы. Предложенная методика рекомендуется для дальнейшего клинического изучения.

Ключевые слова: опухоль почки; резекция почки; полипропиленовый имплант.

COMPARATIVE EFFICIENCY OF SUTURING OF DEFECT OF KIDNEY AFTER RESECTION WITH A MESH IMPLANT ON PIGS MODELS

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Aim. Improvement of the quality of the kidney resection. **Materials and Methods.** A total of 50 laparoscopic kidney resections were performed on pig models. In 25 cases, resection was carried out according to the standard method of hemostasis of the kidney resection bed using U-shaped hemostatic sutures vicryl 3-0. In 25 cases, the kidney resection bed was sutured according to the author's method of hemostasis of the kidney resection bed using a polypropylene mesh. **Results.** The mean operative time was comparable in the comparison groups, intraoperative blood loss was 30% lower in the group of pig models operated on with a prolene implant. The mean weight ratio of the resected kidney to the contralateral kidney was 77.3% after the classic resection of kidney and 85.6% after the resection with use of a prolene implant. **Conclusion.** Laparoscopic kidney resection using a mesh implant is a highly efficient method of kidney resection, providing high-quality hemostasis with less traumatization of healthy renal parenchyma. The proposed method is recommended for further study.

Keywords: kidney tumor; kidney resection; polypropylene implant.



Kidney neoplasms are one of the most common diseases in the oncological practice [1]. The rate of newly found cases of renal cancer continues to increase, the annual growth of the primary cases of renal cancer makes 2%. By the growth rate the renal cancer is the third disease after melanoma of skin and prostate cancer [2,3]. In Russia increase in renal cancer morbidity made 31.4% for 10 years.

Simultaneously with improvement of methods of diagnosis of renal cancer, methods of surgical treatment of the disease also improve. Until a certain time a standard method of treatment for a localized renal cancer was radical nephrectomy. However, numerous multi-center studies showed that resection of kidney, if technically realizable, is comparable with radical nephrectomy by the oncological results [5].

Along with treatment of the main disease, resection of kidney permits to save of the organ and to reduce the risk of postoperative renal failure [6]. Thus an important clinical task is improvement of the technique of organ-saving surgery of the upper urinary tract.

The *aim* of work was to analyze the effectiveness and safety of the method of laparoscopic resection of kidney with application of a mesh implant on a model of pigs.

Materials and Methods

The work was conducted on models of pigs. The experimental conditions corresponded to the International requirements to the conceptions of scientific studies with participation of living organisms (the order of Health Ministry of the USSR №742 of 1984 November 13 «On Approval of Rules of Works Using Experimental Animals»; the Order of Health Ministry of the USSR №1045-73 of 1973 April 6 «Sanitary Rules for Arrangement, Equipment and Management of Experimental-Biological Clinics (Vivaria)»; Federal law of 1995 April 24 №52-ФЗ «On Animal World» (edition of 2013 May 07)).

50 Laparoscopic resections of kidney were performed on models of pigs. In 25 cases resection was performed by a standard method of hemostasis of the kidney resection bed using U-shaped hemostatic vicryl sutures 3-0. In 25 cases the kidney resection bed was sutured using author's method of hemostasis with a polypropylene mesh.

Polypropylene mesh was prepared intraoperatively in the following way: a rectangular piece of 3 cm width and the length of wound + 1 cm was cut out of standard commercial polypropylene mesh and folded twice; the approximated edges were sewn around with separate simple interrupted stitches with 0.5 cm interval using prolene thread 3/0. In the same way the second mesh was prepared.

Resection was performed in the following way. In detection of a wound of a parenchymal organ in case of its damage or in application of resection methods on parenchymal organs or in nephrectomy, polypropylene meshes were applied along the edges of the wound of a parenchymal organ. All visible protruding vessels and the opened cavitory system of kidney were completely sutured and ligated with vicryl №3/0. Using a traumatic needle with 3/0 thread, two polypropylene meshes were fixed on the opposite edges of the wound with U-shaped stitches. For this, the needle at first was drawn at 7 mm distance from the edge of the wound inwards, across polypropylene mesh, fibrous capsule of the kidney, the whole thickness of the renal parenchyma with exit in the wound bed. Then the needle was drawn out of the bottom of the wound through the whole parenchyma of the opposite edge of wound with exit at 7 mm distance from the edge of the wound through fibrous renal capsule and polypropylene mesh placed along the edge of the wound. U-shaped hemostatic stitches were applied along the whole length of the wound with the intervals 7-10 mm. The edges of the wound were pulled up together by tightening the U-shaped stitches until

bleeding stopped. After that the pulled together edges of the wound were sutured over by separate interrupted stitches with prolene

3/0 thread with 1 cm interval.

Stages of the operation are shown in Figures 1, 2.

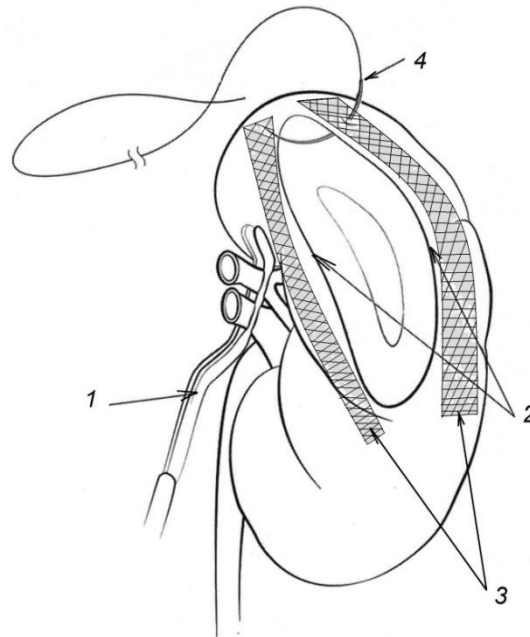


Fig. 1. I stage of the operation of resection of kidney

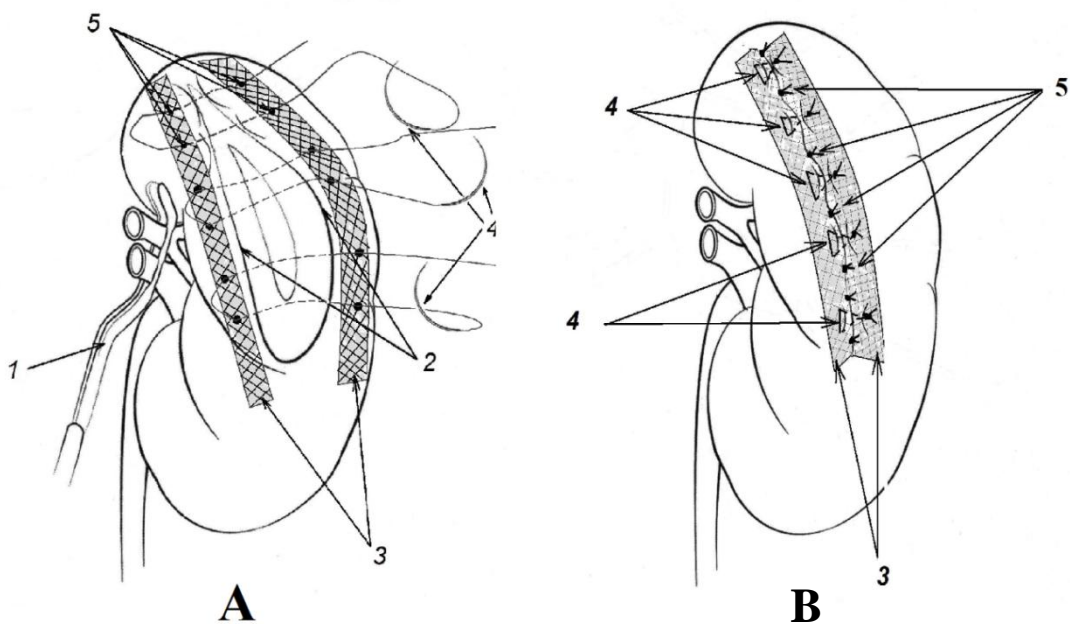


Fig. 2. II stage of the operation of resection of kidney

A) Renal blood flow is blocked by application of a clamp (1) on renal vessels, resection of kidney is performed, and along the edges of the wound (2) polypropylene renal implants are placed (3). The stage of application of U-shaped stitch is completed; the needle is drawn out of the bottom of the wound through the whole parenchyma of the opposite edge of the wound with the output through fibrous capsule of kidney and polypropylene mesh placed along the edge of wound (4), at 7 mm distance from the edge of wound. B) The final picture of the operative wound. The edges of the wound are pulled together by tying up the U-shaped hemostatic stitches (5) applied through polypropylene implants to prevent cutting of parenchyma with the thread, the second row of interrupted sutures is applied on the approximated edges of the polypropylene meshes for strengthening; renal blood flow is recovered.

The renal blood flow is interrupted by application of a clamp (1) on renal vessels, resection of kidney is performed, and along the edges of the wound (2) polypropylene mesh implants are placed (3), the stage of application of U-shaped hemostatic suture has started. The needle is drawn at 7 mm distance from the edge of the wound inward, through polypropylene mesh, fibrous capsule of kidney, the whole thickness of parenchyma with exit into the bed of the wound.

After the surgical intervention, the mean duration of the operation, the mean intraoperative blood loss were evaluated. In a week after the operation the resected kidney and the contralateral kidney were sent to pathohistological

examination, the mean correlation of the weight of resected kidney and of contralateral kidney was determined (in %), the mean weight of visually determined scar of the resection zone (g), microscopic picture of tissue of renal parenchyma from the resection zone were evaluated.

Statistical processing of the obtained results was performed using software package Statistica 10.0 (Stat Soft Inc., USA). In the study the following parameters were calculated: M – arithmetic mean in aggregate; m – error of arithmetic mean (M); p – statistical significance of differences.

Results and Discussion

The main results of the study are given in Tables 1, 2.

Table 1

Comparative Analysis of Mean Time of Operation and of Mean Intraoperative Blood Loss

Parameter	Resection of Kidney by Classic Method	Resection of Kidney with Use of Prolene Implant	p
n	25	25	-
Mean operation time, min	54.4±8.1	51.3±7.5	<0.2
Mean intraoperative blood loss, ml	38.3±4.3	26.6±3.3	<0.1

Table 2

Comparative Analysis of Mean Correlation between Weight of Resected Kidney and of Contralateral Kidney and Mean Weight of Visually Determined Scar of Resection Zone

Parameter	Resection of Kidney by Classic Method	Resection of Kidney with Use of Prolene Implant	p
n	25	25	-
Comparison of the mean weight of resected kidney with that of contralateral kidney, %	77.3±2.7	85.6±2.1	<0.1
Mean weight of visually detected scar of resection zone of kidney, g	8.1±3.7	5.4±3.7	<0.1

The mean operation time was comparable in groups of comparison ($p < 0.2$), besides, a *tendency* to a lower intraoperative blood loss (by 30.5%, $p < 0.1$) was found in the group of pigs operated with use of prolene implant.

It should be noted that microscopic examination of the zone of resection of kidney operated by classic method showed more expressed sclerotic processes that were microscopically manifested by hyalinosis of glomerular arterioles and by extensive areas of tissue necrosis.

rular arterioles and by extensive areas of tissue necrosis.

Thus, despite the absence of statistically significant differences in groups which can be explained by a low statistical power of the research, we believe that the presented results of approbation of author's methods of laparoscopic resection of kidney with use of mesh implant have clinical significance and demonstrated its effectiveness (manifested by the lower intraoperative blood loss, lesser sclera-

tic changes in the postoperative period). The method is recommended for further clinical application.

Conclusion

Laparoscopic resection of kidney with use of mesh implant is an effective method of resection of kidney providing good hemostasis with lesser traumatization of the healthy

renal parenchyma. With use of the method, intraoperative blood loss was 30.5% lower, and the mean weight of the resected kidney compared to the contralateral one was 9.6% higher in the group of pigs operated with use of prolene implant.

The proposed method is recommended for further clinical study.

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Дополнительная информация [Additional Info]

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