The patients with akinetic-rigid form has more severe motor disturbances and lower level of independence. These differences cause finding method for optimization of treatment with considering motor forms of Parkinson's disease. Among the motor complications encountered in patients with various forms of Parkinson's disease, the following prevailed: the phenomenon of "wearing out", unpredictable periods of disconnection, freezing, insufficient "switching on".

It was shown that in patients with rigidity form combined therapy significantly decreased duration "off" period, improved UPDRS-III) and Schwab and England scores, when in group with akinetic-rigidity-tremor form it only decreases UPDRS-III score.

In the course of the treatment, a significant improvement in the clinical symptoms and reduction of motor complications were observed in Parkinson's disease patients receiving treatment using combined levodopa therapy (a combination of short-acting levodopa and long-acting levodopa). we have shown better response for changing treatment strategy in patients with rigidity forms of disease. We can recommend to consider adding of long-release levodopa for management of motor complications in Parkinson's disease patients with rigidity and akinetic-rigid and tremor-dominant forms of Parkinson's disease.

Key words: Parkinson's disease, motor fluctuationы, optimization of treatment.

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SURGICAL TREATMENT OF RECURRENCE OF PILONIDAL CYSTS OF THE SACROCOCCYGEAL AREA USING CROSS-LINKED POLYURETHANE ADHESIVE AND IZOTRETINOIN

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The attempts to address the issue of recurrence rate are aimed at finding an effective surgical technique, but these methods are becoming more and more traumatic, involving not only the intergluteal folds, where the main pathological focus is located, but also a significant part of the surrounding buttocks. The aim of the work was to improve the results of treatment of patients with recurrent pilonidal cysts of the sacrococcygeal area through complex surgical treatment using cross-linked polyurethane adhesive and isotretinoin.

The analysis of surgical treatment of 120 patients with recurrence of pilonidal cyst of the sacrococcygeal area was carried out. The age of the patients ranged from 18 to 46 years. The patients were divided into 2 groups depending on the method of treatment. In group 1 (60 patients), surgical treatment was carried out according to the method of economical median resection developed by the authors with double-row internal extraepidermal sutures in combination with a cross-linked polyurethane adhesive. All patients of this group were prescribed isotretinoin at a dose of 0.5 mg/kg/. In group 2 (60 patients), surgical treatment of pilonidal cysts was performed using the traditional method of median resection.

Surgical treatment of patients with recurrence of pilonidal cysts of the sacrococcygeal area using the developed method in combination with adhesive composition based on cross-linked polyurethane and isotretinoin provides significantly better efficacy compared to traditional method, namely reduces the incidence of postoperative complications: hematoma to 0% vs. 1.7%, seroma to 5% vs. 21.7%, wound infection to 0% vs. 5%, recurrence to 0% vs. 15%.

Key words: *pilonidal cyst, midline resection, isotretinoin, recurrence of pilonidal cyst.*

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Introduction. Pilonidal cyst of the sacrococcygeal area is a common disease, with a detection rate of up to 26 cases per 100 thousand in the general population [1]. The main problems in the treatment of pilonidal cysts are unsatisfactory recurrence rate after surgical treatment, which ranges from 9.7% to 33% according to various authors [2, 3, 4], and long healing process. The attempts to address the issue of recurrence rate are aimed at finding an effective surgical technique, but these methods are becoming more and more traumatic, involving not only the intergluteal folds, where the main pathological focus is located, but also a significant part of the surrounding buttocks. The use of surgical techniques (Karydakis flap, Bascom cleft lift, Limberg flap), marsupialization involve large tissue masses resulting in the formation of scars that are large in area and length. In our opinion, the existing method of wound healing when a surgical wound is left open after excision to heal by scar formation can be considered a desperate operation. The surgery is becoming more extensive but not much more efficient. It is time for surgeons to stop and come back to the issue of the etiology and pathogenesis of the disease in order to apply the existing possibilities of pharmacological effects on the skin, in particular in the intergluteal region, based on the theory of follicular occlusion [5, 6]. In 1975 (before J. Bascom proposed his very similar theory in 1980), Plewig and Kligman added pilonidal cyst to the triad of the diseases with follicular occlusion [7], forming the follicular occlusion tetrad, which is a symptom complex consisting of four conditions having a similar pathophysiology. It includes Hidradenitis suppurativa, acne conglobata, dissecting cellulitis of the scalp, and pilonidal cysts. They have the same pathological process initiated by follicular occlusion [5, 8]. Dermatologists successfully treat severe forms of acne using drugs with an active ingredient isotretinoin, which has effect on the sebaceous glands of the skin, suppresses their activity, and also inhibits proliferation of sebocytes, preventing hyperkeratosis of the epithelial cells of the hair follicle and exfoliation of corneocytes in the gland duct, and thus preventing clogging of the duct with keratin and excessive sebum. The sebaceous gland is the most infected skin structure, the secretory product of which is a substrate for microbial growth, especially Propionibacterium acnes [6, 9]. Isotretinoin normalizes follicular keratinization, has an anti-inflammatory effect, and reduces the chemotaxis of polymorphonuclear leukocytes [10]. A pilonidal cyst can be described as acne with a characteristic location in the intergluteal region, especially if there is lack of hair in the cyst, which occurs in almost half of patients.

On the other hand, it is very important to create conditions for uncomplicated wound healing that are influenced by the microbiome of pilonidal cyst, as well as typical complications such as wound infection, seroma, etc. In our opinion, the use of cross-linked polyurethane adhesive with antibacterial component [11, 12] and high adhesive properties will help to improve the treatment of pilonidal cysts. The use of drugs with isotretinoin will contribute to normalization of the activity of the sebaceous gland and hair follicles of the skin, preventing the occlusion of the follicular duct and, in general, the mechanism of the development of pilonidal disease, as well as its recurrence.

The aim of the study. To improve treatment outcomes among patients with recurrence of pilonidal cyst of the sacrococcygeal area by comprehensive surgical treatment using cross-linked polyurethane adhesive and isotretinoin.

Object and methods of research. The analysis of surgical treatment of 120 patients with recurrence of pilonidal cyst of the sacrococcygeal area was carried out. The age of the patients ranged from 18 to 46 years; the average age was 27±1.2 years. There were 105 (87.5%) men and 15 (12.5%) women. All patients had previously undergone surgery with the use of median resection in various medical institutions in a period of 3 months to 20 years prior to medical visit related to recurrence. The patients were divided into 2 groups depending on the method of treatment.

In group 1 (60 patients), surgical treatment was carried out according to the method of economical median resection developed by the authors with double-row internal extraepidermal sutures in combination with a cross-linked polyurethane adhesive with immobilized albucide. All patients of this group were prescribed isotretinoin at a dose of 0.5 mg/kg/d divided into two doses: in the morning and in the evening. The patients started taking the drug 10 days before the surgery and continued for 2 months after the surgery.

In group 2 (60 patients), surgical treatment of pilonidal cysts was performed using the traditional method of median resection with interrupted cutaneous fixation sutures. The patients of this group underwent a retrospective analysis of the treatment with the study of immediate and long-term results.

The groups of patients were comparable in age and sex ($p>0.05$). The patients of both groups were prescribed antibiotic therapy: ciprofloxacin 500 mg and metronidazole 500 mg per os, both drugs within 5 days from the day when the surgery was performed. Surgical treatment of all patients of both groups was performed on an outpatient basis under local anesthesia with 0.2% lidocaine solution with the addition of adrenaline. The volume of anesthetic solution used per patient ranged from 150 to 200 ml. The time of postoperative follow-up of patients was from 1 to 10 years. The principle of the developed method [13] of comprehensive surgical treatment using an adhesive composition based on cross-linked polyurethane, which was used during the treatment of patients of group 1 is described hereunder. An economical excision of the old postoperative scar was carried out at the location of the wound (sinus opening) to the depth of pathological focus in the subcutaneous adipose tissue. Only pathologically changed tissues were excised with minimal involvement of healthy skin. During the examination of patients with recurrence of pilonidal cysts, sinus opening or a wound with granulation tissue in most cases was located along the intergluteal fold in the area of the old postoperative scar. The wound chamber was cleaned with decamethoxin; after that, two rows of absorbable sutures were applied in stages. The lower row consisted of single sutures with reversal location of the knot (at the bottom of the wound). Polyglycolide and polydioxanone were used as suture material. Further, without tying the

Table – The results of surgical treatment of recurrent pilonidal cysts in patients of group 1 and 2

Complications	Group 1 N=60	Group 2 N=60	P	OR (CI)
Hematoma	0 (0%)	1 (1.7%)	0.558	0.49 (0.04-5.57)
Seroma of postoperative wound	3 (5%)	13 (21.7%)	0.007*	0.19 (0.05-0.71)
Postoperative wound infection	0 (0%)	3 (5%)	0.171	0.24 (0.03-2.19)
Pilonidal cyst recurrence	0 (0%)	9 (15.0%)	0.004*	0.09 (0.01-0.69)

Notes: OR (95% CI) – odds ratio and 95% confidence interval; * – the difference between the groups is statistically significant (p<0.05, the assessment according to Fisher's exact test with the use of Haldane-Anscombe correction at value 0 in complication rate).

sutures of the lower row, the upper row was sutured to the dermis. First, it was put from one corner of the wound to the hypothetical center, then similarly to the other half of the wound. For this suture, monofast (copolymer of glycolide and epsilon-caprolactone) was used, which is a monofilament that provides easy sliding in tissues during tying and optimal biodegradation time. Next, an adhesive composition based on cross-linked polyurethane was injected into the wound, which had three components: an adhesive base, a polymerization accelerator, and albucid (sulfacyl sodium). The composition was prepared during the surgery by mixing in a 20 ml syringe barrel all components with subsequent introduction into the wound. Immediately after mixing the components, the polymerization process begins, which is completed in the wound. The adhesive composition increases in volume due to the bubble formation (foaming) and fills the wound, repeating its relief and eliminating the formation of dead spaces in the wound. The last stage of the surgery was tying of the pre-placed sutures and putting a dry gauze wipe on the wound. In the postoperative period, the results were evaluated by the following indicators: recurrence of pilonidal cyst, wound infection, the presence of seroma of postoperative wound, hematoma.

Research results and their discussion. In the postoperative period among 60 patients of group 1 who underwent surgical treatment according to the developed

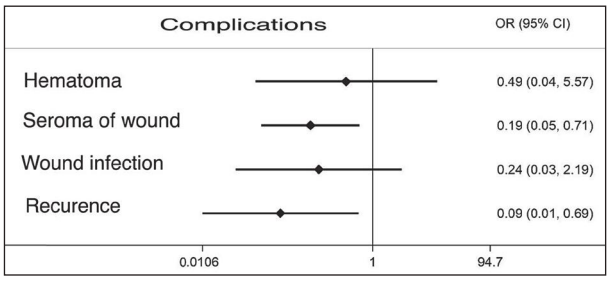

Figure – Assessment of the relative risk of complications in group 1 compared with group 2.

method in combination with the use of an adhesive composition, 3 (5%) patients had **(table)**, seroma of postoperative wound; there were no cases of wound infection, hematoma or recurrence of pilonidal cyst. After taking the drugs, patients complained of such side effects as lip dry in 16 (26.7%) cases, which is typical for isotretinoin, and nausea in 18 (30%) cases, which is characteristic of metronidazole and ciprofloxacin. However, the grade of side effects was not severe and did not require drug discontinuation. Among 60 patients of group 2, 13 (21.7%) patients had seroma of postoperative wound. Postoperative wound infection was observed in 3 (5%) patients. The presence of hematoma was registered in 1 (1.7%) patient. Recurrence of the disease was observed in 9 (15%) patients in a period of 3 months to 2.5 years. Such side effects as nausea were registered in 12 (20%) cases (p=0.206 relative to group 1). One patient had to stop taking the drugs after 3 days due to severe nausea.

The obtained results show a significant improvement of surgical treatment of pilonidal cysts in patients, who underwent surgery according to the developed method using an adhesive composition and medical therapy with isotretinoin.

Group 1 is characterized by a reduced risk of recurrence of pilonidal cyst by 91% (p=0.004); seroma of postoperative wound by 81% (p=0.007); postoperative wound infection by 76% (p=0.171); hematoma by 51% (p=0.558).

Such a result in patients of group 1 was achieved due to the comprehensive surgical treatment of recurrence of pilonidal cysts using an adhesive composition based on polyurethane, taking antimicrobials and retinoids, namely isotretinoin. Isotretinoin is the only drug that alone acts on the four etiopathogenic factors of acne: it reduces acroinfundibular hyperkeratinization and comedogenesis; suppresses sebogenesis by reducing the size and activity of sebaceous glands by up to 90%; decreases the population of Cutibacterium acnes (C. Acnes), formerly called Propionibacterium acnes (P. Acnes) due to changes in the follicular microenvironment; and modulates inflammation by the negative regulation of 2- and 4-membrane receptors (TLR-2 and 4) in keratinocytes, sebocytes, monocytes, corneal cells, and immune cells [14, 15, 16, 17, 18]. Polyurethane adhesive composition cannot replace the suture material during surgical treatment of pilonidal cysts in the sacrococcygeal area, the use of sutures is necessary for reliable connection of the wound walls during the period of postoperative wound healing. The adhesive composition injected into the wound grows as connective tissue strands deep into the porous surface of the polyurethane composition. The formed connective tissue capsule consists of fibroblasts in the thickness of collagen fiber bundles. Its thickness and maturity increase due to the proliferation of fibroblasts and active synthesis of collagen fibers [11]. The formed elastic layer is a barrier to exudation in the wound cavity and an antibacterial barrier even before the stage of connective tissue growth, which, after the introduction of the adhesive composition into the wound, contributes to effective hemo- and lymphostasis, significantly reducing the risk of postoperative hematomas and seromas, as well as preventing recurrence, which depends on the presence of a possible source of infection. The gradual release of albucide from the adhesive composition counteracts the development of bacterial complications of wound healing, both insignificant, in the form of superficial infection, and significant, such as postoperative wound infection, while when using the method of traditional surgical treatment, the wound healing is longer with the risk of active exudation, seroma formation, infection and recurrence [13].

Traditional treatment in the form of median resection with the use of external fixation sutures leads to the formation of the areas of ischemia due to the threads pressure. The suture material injures pilosebation complexes of the skin of wound edges creating conditions for subsequent delayed inflammation with recurrence. The feature

of interrupted sutures of external fixation is an excessive pressure on the skin of wound edges, which has a negative effect on the epidermis and dermis: it damages the integrity and becomes a substrate for subsequent infection.

The negative effects of the method with the use of external interrupted sutures and its downsides were observed in the comparison group **(fig.)**.

Seroma of postoperative wound was registered in 13 (21.7%) patients. Wound infection was observed in 3 (5%) patients. The presence of hematoma was found in 1 (1.7%) patient. Recurrence of the disease was observed in 9 (15%) patients in a period of 3 months to 2.5 years. Wound infection is the main cause of recurrence of the disease, which is confirmed in the literature [19].

Conclusions. Surgical treatment of patients with recurrence of pilonidal cysts of the sacrococcygeal area using the developed method in combination with adhesive composition based on cross-linked polyurethane and isotretinoin provides significantly better efficacy compared to traditional method, namely reduces the incidence of postoperative complications: hematoma to 0% vs. 1.7%, seroma to 5% vs. 21.7%, wound infection to 0% vs. 5%, recurrence to 0% vs. 15%.

The use of isotretinoin in the treatment of recurrence of pilonidal cysts is appropriate in patients with the presence of more than one disease from the follicular occlusion tetrad.

Prospects for further research. We believe that the use of adhesive composition based on cross-linked polyurethane with antibacterial component offers promising prospects not only during the surgical treatment of recurrent cysts, but also during primary radical operations.

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ХІРУРГІЧНЕ ЛІКУВАННЯ РЕЦИДИВІВ ПІЛОНІДАЛЬНИХ КІСТ КРИЖОВО-КУПРИКОВОЇ ДІЛЯНКИ З ВИКОРИСТАННЯМ КЛЕЮ НА ОСНОВІ СІТЧАСТОГО ПОЛІУРЕТАНУ ТА ІЗОТРЕТИНОЇНУ

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Резюме. Спроби вирішити проблему частоти рецидивів хірурги пробують вирішити пошуком ефективної оперативної методики, але ці способи стають все більш травматичними, торкаючись не тільки міжсідничної складки, де розташований основний патологічний осередок, але і значну частину сідниць навколо. Результатом застосування пластичних методик (Карідакіс flap, Баском, ромбоподібна пластика), марсупіалізації є залучення великих масивів тканин, відповідно вони залишають значні по площі та довжині рубці. Хірургія стає більш масштабною, але не набагато ефективнішою. Настала межа, коли хірургі повинні зупинитися та повернутися до питань етіології та патогенезу захворювання для застосування існуючих можливостей фармакологічного впливу на шкіру, в першу чергу міжсідничної ділянки, спираючись на теорію фолікулярної оклюзії.

Метою роботи є необхідність покращити результати лікування пацієнтів з рецидивом пілонідальної кісти шляхом комплексного хірургічного лікування з використанням клею на основі сітчастого поліуретану та ізотретиноїну.

Проведено аналіз хірургічного лікування 120 пацієнтів з рецидивом пілонідальної кісти крижово-куприкової ділянки. Вік пацієнтів від був 18 до 46 років, середній вік пацієнтів склав 27±1,2 років. Чоловіків було 105 (87,5%), жінок 15 (12,5%). Всі пацієнти в минулому перенесли хірургічне лікування в різних лікувальних установах із застосуванням серединної резекції в терміни від 3 місяців до 20 років до звернення з приводу рецидиву. В залежності від способу лікування пацієнти були розподілені на 2 групи.

У першій групі (60 пацієнтів) хірургічне лікування проводилося за розробленим нами способом економної серединної резекції з накладанням двох рядів внутрішніх позаепідермальних швів у поєднанні з клейовою композицією на основі сітчастого поліуретану з іммобілізованим альбуцидом. Усім пацієнтам даної групи призначався ізотретиноїн у дозі 0,5 мг/кг. У другій групі (60 пацієнтів) хірургічне лікування пілонідальних кіст виконувалось за традиційним способом серединної резекції з використанням вузлових швів нашкірної фіксації. В післяопераційному періоді серед 60 пацієнтів 1-й групи, у яких використовували хірургічне лікування за розробленим нами способом в поєднанні з використанням клейової композиції, у 3 (5%) пацієнтів спостерігали серому п/о рани, нагноєння рани не спостерігали, гематом рани не спостерігали, рецидиву пілонідальної кісти не спостерігали. Значне покращення хірургічного лікування пілонідальних кіст досягнуто у пацієнтів групи, де було застосовано методику з використанням клейової композиції та медикаментозним впливом ізотретиноїну.

Хірургічне лікування пацієнтів з рецидивами пілонідальних кіст крижово-куприкової ділянки з використанням розробленого способу в поєднанні з використанням клейової композиції на основі сітчастого пінополіуретану та ізотретиноїну забезпечує суттєво кращу ефективність у порівнянні з традиційним способом, а саме: зменшує частоту післяопераційних ускладнень: гематоми до 0% проти 1,7%, сероми до 5% проти 21,7%, нагноєння рани 0% проти 5%, рецидиву до 0% проти 15%.

Ключові слова: пілонідальна кіста, серединна резекція, ізотретиноїн, рецидив пілонідальної кісти.

SURGICAL TREATMENT OF RECURRENCE OF PILONIDAL CYSTS OF THE SACROCOCCYGEAL AREA USING CROSS-LINKED POLYURETHANE ADHESIVE AND IZOTRETINOIN

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Abstract. *The aim* was to improve treatment outcomes among patients with recurrence of pilonidal cyst of the sacrococcygeal area by comprehensive surgical treatment using cross-linked polyurethane adhesive and isotretinoin.

*Materials and methods***.** The analysis of surgical treatment of 120 patients with recurrence of pilonidal cyst of the sacrococcygeal area was carried out. The age of the patients ranged from 18 to 46 years; the average age was 27±1.2 years. The patients were divided into 2 groups depending on the method of treatment. In group 1 (60 patients), surgical treatment was carried out according to the method of economical median resection developed by the authors with double-row internal extraepidermal sutures in combination with a cross-linked polyurethane adhesive with immobilized albucide and prescription of isotretinoin at a dose of 0.5 mg/kg/d. In group 2 (60 patients), surgical treatment of pilonidal cysts was performed using the traditional method of median resection with interrupted cutaneous fixation sutures.

The groups of patients were comparable in age and sex (p>0.05). The patients of both groups were prescribed antibiotic therapy: ciprofloxacin 500 mg and metronidazole 500 mg per os. All patients of both groups underwent surgical treatment under local anesthesia.

Results and discussion. In the postoperative period, among 60 patients of group 1 who underwent surgical treatment according to the developed method in combination with the use of an adhesive composition, 3 (5%) patients had seroma of postoperative wound; there were no cases of wound infection, hematoma or recurrence of pilonidal cyst. Among 60 patients of group 2, 13 (21.7%) patients had seroma of postoperative wound. Postoperative wound infection was observed in 3 (5%) patients. The presence of hematoma was registered in 1 (1.7%) patient. Recurrence of the disease was observed in 9 (15%) patients in a period of 3 months to 2.5 years. A significant improvement of surgical treatment of pilonidal cysts was achieved in patients, who underwent surgery according to the developed method using an adhesive composition and medical therapy with antimicrobials and isotretinoin.

Key words: pilonidal cyst, polyurethane adhesive, wound closure with tissue adhesives, isotretinoin.

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Conflict of interest:
The authors declare no conflict of interest.

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