

Original Article

Analysis of clinical effect of the four-step pouch approach in ocular plastic surgery

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Abstract: Purpose: To investigate the clinical effect of the four-step pouch plastic surgery in ocular plastic surgery. Methods: Patients with ocular plastic surgery admitted to our hospital from January 2018 to October 2019 were selected as the study subjects. The patients were divided into the observation group ($n=41$) and the control group ($n=43$) according to the different surgical modalities received. The traditional skin approach of lower eyelid, and the four-step pouch plastic surgery were used as the control group and observation group, respectively. The operation time, postoperative recovery time of the eye skin, clinical effect, postoperative complications, and satisfaction rate were compared between the two groups. Results: The operation time was compared between the two groups, indicating no significant difference ($P > 0.05$). The postoperative recovery time of the eye skin was significantly shorter in the observation group than the control group ($P < 0.05$). The total clinical effective rate (95.12%) was significantly higher in the observation group than that in the control group (79.07%) ($P < 0.05$). The total incidence of complications (7.32%) was significantly lower in the observation group than that in the control group (25.58%) ($P < 0.05$). The overall satisfaction rate was significantly higher in the observation group than the control group ($P < 0.05$). Conclusion: The clinical effect of four-step pouch plastic surgery in ocular plastic surgery is significant.

Keywords: Four-step pouch plastic surgery, eyes, plastic surgery, clinical effect

Introduction

As the quality of life of our residents continues to improve, people are demanding more and more beauty. The appearance of the eyelid pouch has an adverse aesthetic impact on the patient. An eyelid pouch is caused mainly by the gradual appearance of laxity and atrophy due to the loss of elasticity of the skin around the eye, resulting in an imbalance of intraocular fat and orbital septum support structures and herniation due to the accumulation of fat in the septum [1-3]. Over time, the eyelid pouch will continue to aggravate, easily leading to eyelid recession and ectropion, which can cause eye diseases such as keratitis, cataracts, and vision loss, posing a threat to patients' visual health [4, 5]. Four-step pouch plastic surgery can remove excess skin and fat and repair oculofacial support structures in the oculofacial shape [6, 7], but clinical studies applying this method in oculoplasty have been rarely reported. Therefore, this study is design-

ed to investigate the clinical effect of four-step pouch plastic surgery in ocular plastic surgery to provide a data reference for the clinical treatment of oculoplastic patients.

Experimental

General information

Patients with ocular plastic surgery admitted to our hospital from January 2018 to October 2019 were selected as the study subjects. Inclusion criteria: (1) complete clinical information; (2) patient examination showing laxity of the eyelid skin, orbital lipid expansion, and significant pouch formation; (3) no contraindication to surgery; (4) informed consent and signed informed consent for this study. Exclusion criteria: (1) combined liver, kidney, endocrine, and cardiovascular diseases; (2) pathologic eyelid hypertrophy; (3) secondary eye-face surgery; (4) drug allergy; and (5) loss of follow-up. A total of 84 patients who met the above inclu-

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sion and exclusion criteria were grouped according to the different surgical modalities they underwent, 41 of whom underwent a four-step pouch plastic surgery and were included in the observation group, and 43 of whom underwent a routine skin approach of the lower eyelid and were included in the control group. This study has been approved by the Ethics Committee of our hospital.

Methods

The traditional skin approach of the lower eyelid was used in the control group. Namely, the patient was placed in the supine position and administered 5 mL of 2% lidocaine for local anesthesia. The incision was made along the lower eyelid eyelashes, ensuring that the incision is as parallel as possible to the lower eyelid, separating the skin from the orbicularis oculi muscle, opening the orbital septum to remove inflated fat and excess skin, and closing the surgical incision with hemostatic sutures. After surgery, erythromycin eye ointment was administered topically, and a sterile dressing was used to cover the bandage, and the incision was exposed after 24 hours of drug change. The stitches were removed 10 days after the operation. During this period, the patients were asked to avoid irritating spicy food and pay attention to eye cleaning.

The four-step pouch plastic surgery was used in the observation group. Step 1: The patient was placed in the supine position, and the line was marked with a blue line extending 2 to 3 mm below the lower lid margin, medially to the near enophthalmos, and laterally to the outer corner of the eye, extending 7 to 10 mm in the direction of the crow's feet. 5 mL of 2% lidocaine was administered for local infiltration anesthesia (containing 1:200,000 units of epinephrine), an 11-gauge sharp blade was used to make an incision along the marker line, a plastic forceps was used to lift the skin margin of the incised lower lid, and an ophthalmic shear was used to subliminally separate the subcutaneous and orbital surface of the orbital muscle, down to the infraorbital margin. Step 2: We removed the excess fat exposed to the orbital septum, placed it back into the orbit after electrocoagulation for hemostasis, tightened the orbital septum with 5-0 silk suture and sutured it on the periosteum of the inferior border of the orbit. Step 3: The lateral

canthal ligament was located, isolated, suspended, and fixed on the periosteum of the lateral orbital wall using 1-0 threads to tighten the loose orbicularis oculi muscle. Step 4: We lifted up the loose skin of the lower eyelid, asked the patient to open mouth and look up, marked the loose skin with methylene blue, ensured that the loose skin is removed under no tension of incision, so that made the skin of lower eyelid tight, and appropriately removed the oblique downward triangular skin along the fishtail lines of lateral canthus, reduced the fishtail lines on the one hand, prevented postoperative lower eyelid recession and ectropion on the other hand, and used 7-0 nylon suture to intermittently suture the incision after hemostasis. After surgery, erythromycin eye ointment was administered topically, and a sterile dressing was used to cover the bandage, and the incision was exposed after 24 hours of drug change. The stitches were removed 10 days after the operation. During this period, the patients were asked to pay attention to eye cleaning and avoid irritating spicy food.

Observation indicators

(1) The mean operation time and postoperative recovery time of the eye skin were observed between the two groups. (2) The clinical efficacy was observed between the two groups, namely significant: the skin of the lower eyelid became compact, the symptoms of sagging, drooping, and bloating disappeared, and there was no discomfort in the eye movement; effective: the skin of the lower eyelid was relatively compact, the symptoms of sagging, drooping and bloating disappeared; ineffective: there was discomfort in eye movement, and no improvements in sagging, drooping and bloating were noted in the skin of the lower eyelid. Total effective rate = (significant + effective)/total cases × 100%. (3) The postoperative complications were observed in the two groups, including incisional infection, lid margin recession, ocular congestion and erythema, and ectropion. (4) Patients were followed up for 6 months in the two groups, and their satisfaction with the treatment was measured by using the satisfaction questionnaire developed by our hospital, with a total score of 100, with > 80 as satisfied, 60 to 80 as generally satisfied, and < 60 as unsatisfied. Total satisfaction rate = (satisfaction + general satisfaction)/total cases × 100%.

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Table 1. Comparison of general data between the two groups

Group	Cases	Gender		Age ($\bar{x} \pm s$, year)	body mass index ($\bar{x} \pm s$, kg/m ²)
		Male	Female		
Observation group	41	4 (9.76)	37 (90.24)	54.78±7.95	23.51±1.24
Control group	43	5 (11.63)	38 (88.37)	53.84±8.21	23.72±1.43
χ^2/t		0.077		0.533	0.718
<i>P</i>		0.782		0.595	0.475

Table 2. Comparison of the operation time between the two groups ($\bar{x} \pm s$)

Group	Cases	Operation time (min)
Observation group	41	19.45±3.54
Control group	43	18.78±2.93
<i>t</i>		0.946
<i>P</i>		0.346

Table 3. Comparison of the postoperative recovery time of the eye skin between the two groups ($\bar{x} \pm s$)

Group	Cases	2.2 Postoperative recovery time of the eye skin (d)
Observation group	41	25.67±6.93
Control group	43	29.14±5.94
<i>t</i>		2.468
<i>P</i>		0.016

Statistical analysis

The data were processed by the SPSS19.0 statistical software, where the measurement data were expressed as mean \pm standard deviation ($\bar{x} \pm s$) and were detected by the t-test. Count data were expressed as rate (%) and composition ratio, and detected by the chi-square (χ^2) test. $P < 0.05$ suggested a significant difference.

Results

Comparison of the general information between the two groups

There were no significant differences in gender, age, and body mass index of patients between the two groups ($P > 0.05$), as shown in **Table 1**.

Comparison of operation time between the two groups

The operation time was compared between the two groups, indicating no significant difference ($P > 0.05$), as shown in **Table 2**.

Comparison of the postoperative recovery time of the eye skin between the two groups

The postoperative recovery time of the eye skin was significantly shorter in the observation group than that of the control group, indicating that the difference was significant ($P < 0.05$), as shown in **Table 3**.

Comparison of clinical efficacy between the two groups

The total clinical effective rate (95.12%) was significantly higher in the observation group than that of the control group (79.07%), as shown in **Table 4**.

Comparison of the incidence of complications between the two groups

Complications occurred in a total of 14 patients, all of whom received timely corresponding treatment and recovered well. The total incidence of complications (7.32%) was significantly lower in the observation group than that in the control group (25.58%) ($P < 0.05$), as shown in **Table 5**.

Comparison of satisfaction rates between the two groups

The overall satisfaction rate was significantly higher in the observation group than that in the control group ($P < 0.05$), as shown in **Table 6**.

Discussion

The eyelid pouch is a swollen, pouchy tissue of the lower lid, which dramatically affects the patient's appearance, makes the patient look tired and old, and can also endanger vision [8]. Currently, patients with eyelid pouch are mainly in the middle-aged and elderly population, which may be related to age growth. With an increase in age, some physiologic degenerative changes occur in the eye area, such as

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Table 4. Comparison of clinical efficacy between the two groups [n (%)]

Group	Cases	Significant	Effective	Ineffective	Overall effective rate
Observation group	41	16 (39.02)	23 (56.10)	2 (4.88)	39 (95.12)
Control group	43	13 (30.23)	21 (48.84)	9 (20.93)	34 (79.07)
χ^2					4.752
<i>P</i>					0.029

Table 5. Comparison of the incidence of complications between the two groups [n (%)]

Group	Case	Incisional infection	Lid margin recession	Ocular congestion and erythema	Ectropion	Overall incidence
Observation group	41	2 (4.88)	0 (0.00)	1 (2.44)	0 (0.00)	3 (7.32)
Control group	43	4 (9.30)	2 (4.65)	4 (9.30)	1 (2.33)	11 (25.58)
χ^2						5.041
<i>P</i>						0.025

Table 6. Comparison of satisfaction rates between the two groups [n (%)]

Group	Cases	satisfied	commonly dissatisfied	Total
Observation group	41	26 (73.41)	12 (29.27)	38 (92.68)
Control group	43	16 (37.21)	9 (20.93)	25 (58.14)
<i>t</i>				13.36
<i>P</i>				< 0.001

degeneration of the tissue supporting the orbital septum of the lower eyelid, resulting in a disruption of the balance of ocular adipose tissue and lid support structures [5-10]. An external incision to remove the pouch can re-establish this balance by anatomically resetting the orbital septal fat and sagging orbital orbicularis muscle and removing excess tissue and skin to improve the appearance of the lower eyelid.

Degeneration of the tissue supporting the orbital septum of the lower eyelid and disruption of the adipose tissue balance is the principal foundation for the eyelid pouch. The four critical steps in a four-step pouch plastic surgery include exorbital septal fat removal, orbital septum reinforcement, epiglottic ligament suspension, and excess skin removal. The reason for the focus on orbital septal fat is that an eyelid pouch in middle-aged and elderly patients is caused by an excess of orbital septal fat, resulting in a herniated state due to insufficient strength of orbital septum support [11]. In surgical incision, the closer to the lower eyelid margin is, the less the postoperative scarring will be. Still, the pain sensation of the person seeking medical attention will also become

obvious during surgery. Therefore, an incision is usually made 2 to 3 mm below the lower eyelid margin so that the postoperative recovery scar is not too noticeable [12, 13]. The incision line should be designed so that its lateral end does not extend beyond the hidden sulcus of the epiglottis and does not intersect with it, to avoid postoperative scarring of the epiglottis, resulting in a lowering of the epiglottis and the laxity of the skin covering the epiglottis. Besides, considering that the orbital septal fascia in the middle-aged and the elderly are very loose and thin [14], it is difficult to support the standard anatomical position of the orbital septal fat. Therefore, after the septal fat is removed and reset, the orbital septal fascia is stitched and reinforced. However, the traditional skin approach of the lower eyelid does not provide enough tension to lift the lower eyelid. Still, it can easily pull down the laxity in the outer contour in terms of long-term results. In addition, it is necessary to remove the excess skin from the eye because the skin of middle-aged and elderly patients is saggier, and to ensure that the lower eyelid of the eye of middle-aged and elderly patients can move naturally, it is also necessary to pay attention to the reasonableness of the removal of excess skin to avoid excessive removal.

In this study, the clinical efficacy of the experimental study was significantly better than that of the traditional skin approach of the lower

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eyelid. This is different from traditional surgery since the patient in the four-step pouch plastic surgery is instructed to look up and open his or her mouth, which contributes to reasonably remove the excess loose skin and reduce the separation of the lower eyelids, ensuring eye movement and visual function after surgery. Foreign scholars mention that fishtail lines can make the aging face more sluggish and older [15]. Intraoperative treatment of fishtail lines can also reduce the risk of postoperative lid margin recession and ectropion to a certain extent [16]. In this study, no lower eyelid recession and ectropion was found in the patient receiving the follow-up of four-step pouch plastic surgery, which was consistent with the above conclusion. The incidence of complications was lower than that of the traditional skin approach of the lower eyelid, and the satisfaction rate in the patient was higher than that in the patient who underwent the traditional skin approach of the lower eyelid. The orbicularis oculi muscle in the outer canthus can be fixed with absorbable wires on the lateral orbital periosteum, which can prevent postoperative complications such as lid margin recession and ectropion [17, 18], thus improving the plastic surgery results and the satisfaction rate.

To sum up, the four-step pouch plastic surgery exerts significant clinical effects on ocular plastic surgery, with few complications and high satisfaction rate of the patient. However, due to the limitations of the conditions and timing of this study, the results may be biased and still should be supported by a larger sample size.

Disclosure of conflict of interest

None.

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References

- [1] Bilkhu P, Wolffsohn JS, Hilton A, Matthews G, Legood S and Riley L. Microwave decontamination of eyelid warming devices for the treatment of meibomian gland dysfunction. *Cont Lens Anterior Eye* 2016; 39: 293-297.
- [2] Yang C, Zhang P and Xing X. Tear trough and palpebromalar groove in young versus elderly

- adults: a sectional anatomy study. *Plast Reconstr Surg* 2013; 132: 796-808.
- [3] Lin T, Yu J, Hu Y, Liu H, Lu Y, Zhao M, Chen H, Chen X and Li G. Preliminary experience of dual-port laparoscopic distal gastrectomy for gastric cancer. *J Gastrointest Surg* 2019; 22: 35-42.
- [4] Chen JL, Liu CH and Yi CG. Indications of transconjunctival orbital septum fat release and preservation for orbitopalpebral sulcus in lower eyelid blepharoplasty. *Aesthetic Plast Surg* 2017; 41: 753.
- [5] Shapiro B, Kulkarni S, Nacev A, Sarwar A, Preciado D and Depireux DA. Shaping magnetic fields to direct therapy to ears and eyes. *Annu Rev Biomed Eng* 2014; 16: 455-481.
- [6] Asilian A, Bafandeh B, Shahmoradi Z, Faghihi G, Bostakian A, Mozafarpour S and Hosseini SM. Micropunch blepharopeeling versus blepharoplasty; what is the best procedure for upper eyelid rejuvenation? *J Cosmet Dermatol* 2018; 17: 1182-1188.
- [7] Rohrich RJ, Villanueva NL and Afrooz PN. Refinements in upper blepharoplasty: the five-step technique. *Plast Reconstr Surg* 2018; 141: 1144-1146.
- [8] Wang W, Li J and Li X. Countermeasures to prevent lower eyelid plastic surgery in the middle and old aged people's lower eyelid plastic surgery. *Chinese and Foreign Medical Research* 2013; 11: 167-168.
- [9] Hintschich C. Periocular plastic surgery. *Dtsch Arztebl Int* 2010; 107: 141-146.
- [10] Lindlein N, Bich A, Eisner M, Harder I, Lano M, Voelkel R, Weible K and Zimmermann M. Flexible beam shaping system using fly's eye condenser. *Appl Opt* 2010; 49: 2382-2390.
- [11] Donnelly KS, Pearce JW, Giuliano EA, Fry PR and Middleton JR. Surgical correction of congenital entropion in related Boer goat kids using a combination Hotz-Celsus and lateral eyelid wedge resection procedure. *Vet Ophthalmol* 2014; 17: 443-447.
- [12] Shah MM, Steele EA, White KP and Wilson DJ. Syringoid eccrine carcinoma of the eyelid presenting as cicatricial entropion. *Int J Ophthalmol* 2014; 7: 912-913.
- [13] Ding J, Chen F, Zhai W, Zhao H and Pan Y. Orbicularis oculi muscle transposition for repairing involitional lower eyelid entropion. *Graefes Arch Clin Exp Ophthalmol* 2014; 252: 1315-1318.
- [14] Chen JL, Liu CH and Yi CG. Transconjunctival orbital septum fat release and preservation for orbitopalpebral sulcus in lower eyelid blepharoplasty. *Aesthetic Plast Surg* 2017; 41: 568-572.
- [15] Yang S, Kim BR, Kim HS, Choi CW, Jo SJ and Youn SW. A quantitative, objective method for

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- evaluating the surgical outcomes of baggy eyelid correction using orbital gray scale analysis. *J Cosmet Dermatol* 2019; 18: 1814-1820.
- [16] Schwarcz RM and Kotlus B. Complications of lower blepharoplasty and midface lifting. *Clin Plast Surg* 2015; 42: 63-71.
- [17] Pu LL. Towards more rationalized approach to autologous fat grafting. *J Plast Reconstr Aesthet Surg* 2012; 65: 413-419.
- [18] Sensöz O and Orbay H. Nonresective shrinkage of the septum and fat compartments of the upper and lower eyelids: a comparative study with carbon dioxide laser and Colorado needle. *Plast Reconstr Surg* 2007; 119: 2315-2316; author reply 2316-2317.