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Analysis of the Application Value and Complication Rate of Hyaluronic Acid and Silicone Gel Prosthesis in Cosmetic Rhinoplasty

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Abstract: *Objective:* To analyze the application value and complication rate of hyaluronic acid and silicone gel prosthesis in cosmetic rhinoplasty. *Methods:* 60 patients who underwent cosmetic rhinoplasty in this clinic from March 2022 to March 2023 were selected as research subjects and divided into the hyaluronic acid group and the silicone group by single and double-digit lottery method, with 30 cases in each group. Hyaluronic acid material was used for rhinoplasty in the hyaluronic acid group, and silicone gel material was used for rhinoplasty in the silicone group. The two groups were compared in terms of postoperative complications, improvement rate of nasal shape, satisfaction of firmness, evaluation of surgical satisfaction, and life situation. *Results:* The incidence of postoperative complications was lower in the hyaluronic acid group than in the silicone group ($\chi^2 = 4.320$, $P < 0.05$); after nasal shape repair, the rate of nasal shape improvement was better in the hyaluronic acid group (29/96.67%) than in the silicone group (24/80.00%) ($\chi^2 = 4.043$, $P < 0.05$); the evaluation of satisfaction with the postoperative firmness of the nasal shape suggested that patients in the hyaluronic acid group (28/93.33%) had a better firmness than patients in the silicone group (22/80.00%) ($\chi^2 = 4.320$, $P < 0.05$); the evaluation of satisfaction with the surgery in the hyaluronic acid group was higher than that in the silicone group ($P < 0.05$); compared with the preoperative period, the life situation of both groups improved after the surgery, and the scores of the hyaluronic acid group were better than those of the silicone group (both $P < 0.001$). *Conclusion:* The application of hyaluronic acid in cosmetic rhinoplasty achieved high clinical value and safety, and this method is recommended to be widely used.

Keywords: Hyaluronic acid; Silicone prosthesis; Cosmetic rhinoplasty; Complication rate

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1. Introduction

In recent years, with the development of China's economic level, people's pursuit of beauty has become increasingly higher, and many people undergo cosmetic plastic surgery to further improve the aesthetic appearance of their faces [1]. Rhinoplasty is a common cosmetic plastic surgery, the nose is located in the middle of the face, and its aesthetics has an important impact on the overall appearance of the face. Rhinoplasty

transplants material to the nose to act as a filler [2]. Early rhinoplasty used its own bone as a filler and the nose is well augmented after filling, but the bone is human tissue, the process of removing the bone is painful and will cause irreversible damage to the body, so safer and more effective filler materials for rhinoplasty should be explored [3]. Hyaluronic acid, also known as hyaluronan, is injected into the nose to fill the nose, which in turn acts as a rhinoplasty. Hyaluronic acid rhinoplasty is not permanent and can last for six months to a year each time, with simple operation and small damage, which is favored by many rhinoplasty patients. Silicone gel prosthesis is a filler material synthesized from silicone material, which is a very safe implantable material with good plasticity and high biocompatibility. However, silicone prosthesis is filled by surgery, which is highly damaging and prone to displacement and infection. The purpose of this paper is to study and analyze the application value and complication rate of hyaluronic acid and silicone gel prosthesis in cosmetic rhinoplasty.

2. General information and methods

2.1. General information

60 rhinoplasty patients included in the study were grouped by single and double-digit lottery method, and there was no difference in the comparison of baseline data of gender, age, education level, and body mass in each group ($P > 0.05$). The data are shown in **Table 1**.

Table 1. Comparison of general information between the two groups [n (%) / mean ± standard deviation (SD)]

Groups	Cases	Gender		Age (years)		Educational level		Body mass (kg/m^2)	
		Male	Female	Range	Average	Middle school and below	High school and above	Range	Average
Hyaluronic acid group	30	22 (73.33)	8 (26.67)	22–43	32.59 ± 1.35	17 (56.67)	13 (43.33)	18–23	20.49 ± 0.36
Silicone group	30	20 (66.67)	10 (33.33)	22–45	32.61 ± 1.33	14 (46.67)	16 (53.33)	18.5–23	20.51 ± 0.32
t/χ^2	-	0.3175		0.0578		0.6007		0.2274	
P	-	0.5731		0.9541		0.4383		0.8209	

2.2. Methods

The hyaluronic acid group used hyaluronic acid material to perform rhinoplasty. Povidone-iodine was used to disinfect the patient's nasal tissue and the injection position in the nose was marked. The skin of the face was disinfected, the needle was inserted from the subcutaneous plane to the nasal ridge, and the position of the needle was adjusted. Subsequently, hyaluronic acid was injected into it, and the shape of the nose and the tip of the nose were observed after the injection. After the shape was fixed, ice was applied to the nose for 15 minutes.

The silicone group used silicone prosthesis material to perform rhinoplasty. Assessing the patient's facial features, a surgical plan and the location of rhinoplasty were formulated. A clear surgical incision was made, the subcutaneous fascia was cut and separated, the silicone prosthesis was filled into it. The position of the filler was adjusted, the prosthesis was fixed, and the tissues were sutured.

2.3. Observation index

A comparison of the two groups was performed in terms of postoperative complications, improvement rate of nasal shape, firmness satisfaction, evaluation of surgical satisfaction, and life situation.

2.4. Statistical analysis

With SPSS21.0 statistical software, count data were expressed by [n (%)] and χ^2 test, measurement data were expressed by mean ± SD and *t*-test, $P < 0.05$ indicated a statistically significant difference.

3. Results

3.1. Comparison of postoperative complications between the hyaluronic acid group and the silicone group

After surgical repair, the complication rate was significantly lower in the hyaluronic acid group than in the silicone group ($P < 0.05$), as presented in **Table 2**.

Table 2. Comparison of postoperative complications between the two groups [*n* (%)]

Groups	Cases	Tissue infection	Allergy	Material displacement	Total incidence
Hyaluronic acid group	30	1 (3.33)	1 (3.33)	0 (0.00)	2 (6.67)
Silicone group	30	3 (10.00)	4 (13.33)	1 (3.33)	8 (26.67)
χ^2	-	-	-	-	4.320
P	-	-	-	-	0.038

3.2. Comparison of nasal shape improvement rates between the hyaluronic acid group and the silicone group

After surgical repair, the total improvement rate of nasal shape in the hyaluronic acid group was higher than that in the silicone group ($P < 0.05$), as shown in **Table 3**.

Table 3. Comparison of the improvement rate of nasal shape between the two groups [*n* (%)]

Groups	Cases	Excellent	Good	Poor	Total improvement rate
Hyaluronic acid group	30	21 (70.00)	8 (26.67)	1 (3.33)	29 (96.67)
Silicone group	30	16 (53.33)	8 (26.67)	6 (20.00)	24 (80.00)
χ^2	-	-	-	-	4.043
P	-	-	-	-	0.044

3.3. Comparison of satisfaction with nasal firmness between the hyaluronic acid group and the silicone group

After the surgical repair, the total satisfaction of the hyaluronic acid group with the nasal firmness was significantly higher than that of the silicone group ($P < 0.05$), as demonstrated in **Table 4**.

Table 4. Comparison of postoperative satisfaction of nasal firmness between the two groups [*n* (%)]

Groups	Cases	Very satisfied	More satisfied	Dissatisfied	Total satisfaction
Hyaluronic acid group	30	22 (73.33)	6 (20.00)	2 (6.67)	28 (93.33)
Silicone group	30	15 (50.00)	7 (23.33)	8 (26.67)	22 (73.33)
χ^2	-	-	-	-	4.320
P	-	-	-	-	0.038

3.4. Comparison of surgical satisfaction evaluation between the hyaluronic acid group and the silicone group

The results suggest that patients in the hyaluronic group rated the rhinoplasty results, surgical design, and surgical procedure higher than those in the silicone group ($P < 0.05$), as shown in **Table 5**.

Table 5. Comparison of surgical satisfaction evaluation between the two groups [*n* (%)]

Groups	Cases	Surgical results	Surgical design	Surgical procedure
Hyaluronic acid group	30	27 (90.00)	29 (96.67)	28 (93.33)
Silicone group	30	20 (66.67)	24 (80.00)	21 (70.00)
χ^2	-	4.8118	4.0431	5.4545
P	-	0.0282	0.0443	0.0195

3.5. Comparison of the life situation of the hyaluronic acid group and the silicone group

Compared with the preoperative period, the postoperative social function, physiological function, emotional function, and mental vigor scores of the two groups were improved, and the hyaluronic acid group was better than the silicone group ($P < 0.05$), as presented in **Table 6**.

Table 6. Comparison of life situation between the two groups (mean ± SD, points)

Groups	Cases	Social functions		Physiological functions		Emotional functions		Mental vigor	
		Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
Hyaluronic acid group	30	75.59 ± 4.52	93.57 ± 5.54	73.24 ± 4.18	91.38 ± 5.67	74.28 ± 4.51	92.34 ± 5.41	74.28 ± 4.51	92.56 ± 5.32
Silicone group	30	75.74 ± 4.22	84.21 ± 5.64	73.56 ± 4.08	82.41 ± 5.65	74.89 ± 4.26	83.24 ± 5.64	72.41 ± 4.22	83.54 ± 5.41
χ^2	-	0.1328	6.4847	0.3000	6.1379	0.5385	6.7280	1.6583	6.5112
P	-	0.8948	0.0000	0.7652	0.0000	0.5923	0.0000	0.1027	0.0000

4. Discussion and conclusion

Plastic and cosmetic surgery refers to the facial remodeling of appearance, where unsatisfactory parts of the body are brought to a desirable state by appropriate means to make the body parts more aesthetically pleasing [4]. Currently, cosmetic surgery can be realized through surgery, medical devices, and drugs. The nose is an important facial organ and it is eye-catching in the aesthetic performance of the face, thus many people have a certain pursuit for the beauty of the nose and think that their nose is not straight enough and the root of the nose is not high enough, and they improve the beauty of the nose through rhinoplasty [5]. Rhinoplasty is a cosmetic approach to the nose, which is performed by placing materials into the nose in order to augment or elevate the nose to achieve higher aesthetics. Rhinoplasty is one of the most common procedures in the field of cosmetic surgery, and with the advancement of cosmetic surgery techniques, rhinoplasty has been perfected and its safety is guaranteed. Hyaluronic acid and silicone gel prosthesis are commonly used filler materials for rhinoplasty, but these two different filler materials have their advantages and disadvantages. Silicone prosthesis used for rhinoplasty is medical silicone material, which has very good physical properties, such as high and low-temperature resistance, corrosion resistance, no toxicity, and generally will not be deformed [6]. Silicone of

clinical quality can be used for a long time, and the chemical properties are very stable. It can be used as a filling material for rhinoplasty. It is easy to remove and will not fuse with human tissue. After removal, the nose will return to its original shape. There are certain risks in using silicone prosthesis for rhinoplasty. Too-large silicone prosthesis will increase the local skin tension, resulting in swelling, inflammation, ulceration, and other adverse events in the nose. Additionally, silicone carries static electricity and can easily carry the cilia, which may lead to infection after the repair. After rhinoplasty with silicone prosthesis, the postoperative recovery period is relatively long; under strong light, the nose appears translucent and the contour of the nose becomes hard and unnatural [7]. Hyaluronic acid is a newly emerged rhinoplasty material in recent years. The human body itself contains hyaluronic acid, which is widely distributed in various tissues, with the highest content in the distribution of skin tissues. The main role of hyaluronic acid is to maintain the stability and elasticity of tissues. The use of hyaluronic acid in rhinoplasty has strong advantages. Hyaluronic acid is injected for rhinoplasty, and compared with silicone prosthesis, its traumatization is effectively controlled, and the postoperative recovery period is very short, which will not leave a scar on the skin surface. After hyaluronic acid injection, the effect of rhinoplasty is immediate, which will not affect the patient's life and work. Hyaluronic acid can be fused with hyaluronic acid in the human body, which can improve the activity of the skin and strengthen the moisturizing effect on the skin. After injection, there is almost no redness, swelling, allergies, and other adverse reactions. Hyaluronic acid can decompose with hyaluronidase, if the satisfaction with the rhinoplasty effect is poor after hyaluronic acid rhinoplasty, hyaluronidase can be injected to dissolve the hyaluronic acid so that the nose can be restored to its original shape. After the nose is filled with hyaluronic acid, there will be no local reflection phenomenon, and the effect of filling is very natural. Hyaluronic acid rhinoplasty is not permanent and lasts about six months to a year. The hyaluronic acid rhinoplasty effect will gradually disappear with time, after which one can undergo hyaluronic acid rhinoplasty again. The safety of hyaluronic acid rhinoplasty is guaranteed by the purity of the material. The higher the purity of the injected material, the lower the chance of allergic and rejection reactions.

The results of this study suggest that the postoperative complication rate of the hyaluronic acid group was lower than that of the silicone group ($P < 0.05$); after the postoperative recovery period, the rate of improvement of the nasal shape of the hyaluronic acid group was significantly higher than that of the silicone group ($P < 0.05$); whereas the hyaluronic acid group's evaluation of the effect of the rhinoplasty surgery, the surgical design, and the surgical process was also higher than that of the silicone group ($P < 0.05$). Compared with the preoperative period, the postoperative scores of social function, physiological function, emotional function, and mental vigor of patients in both groups were improved, and the hyaluronic acid group was better than the silicone group ($P < 0.05$). In summary, the application of hyaluronic acid in cosmetic rhinoplasty has significant efficacy, the adverse incidence of postoperative complications has been lowered, and it has high clinical promotion and application value.

Disclosure statement

The author declares no conflict of interest.

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