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Effectiveness and incidence of adverse reactions of nasal endoscopic surgery in the treatment of chronic rhinosinusitis with nasal polyps

Shengwei Chen[1*], Chubiao Lin[1] and Zhonghong Fang[1]

Abstract

Background To research and examine the efficacy of nasal endoscopic surgery in management of chronic sinusitis with nasal polyps, as well as how it affects the likelihood of adverse responses.

Methods The collecting of samples was scheduled to take place between January 2020 and December 2022. The traditional surgery team consisted of 80 clients with chronic sinusitis and nasal polyps. Retrospective analysis of clinical information of two teams of clients with chronic sinusitis and nasal polyps who underwent surgery using different techniques, contrast of the surgical conditions, postoperative complications, recovery time, and postoperative pain scores between the two teams, as well as postoperative serum inflammatory factor indexes, immune function indexes, sleep state indexes, and quality of life grades of the two teams before and after.

Results The study team had procedure in less time than traditional surgery team($P < 0.05$), and they experienced less intraoperative blood loss than traditional surgery team. The values in study team were lower than those in traditional surgery team in terms of overall incidence rate of postoperative adverse responses($P < 0.05$). The grades of four aspects of quality of life in two teams after the operation greatly improved from those before operation. The grades of four aspects of quality of life in the two teams after operation greatly improved from those before operation, all $P < 0.05$.

Conclusion In contrast to conventional open sinus surgery, using nasal endoscope on clients with chronic sinusitis and nasal polyps can successfully remove polyps from nasal cavity, open sinuses, and lower risk of intraoperative problems.

Keywords Chronic sinusitis, Nasal polyps, Nasal endoscopic surgery

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Background

Chronic sinusitis is a common chronic disease in otolaryngology. According to the European Position Paper on Rhinitis and Nasal Polyps (EPOS 2020), chronic rhinosinusitis (CRS) is a common chronic inflammatory disease of the nasal cavity and paranasal sinuses, which is defined as an asymptomatic inflammation that lasts for at least 12 weeks. CRS is classified into two main categories: CRS with nasal polyps (CRSwNP) and CRS without nasal polyps (CRSsNP), and these two types have different pathophysiologic characteristics; CRSwNP is usually associated with a Th2-driven inflammatory response, whereas CRSsNP may have a more heterogeneous cytokine profile. After the onset of the disease, patients often experience symptoms such as nasal congestion, runny nose, and olfactory dysfunction, causing heavy physical and mental pain to the patients. Additionally, the disease's protracted and lengthy course can have a negative impact on clients' day-to-day lives, significantly lowering their quality of life following the disease [1–3]. Patients with chronic sinusitis are often accompanied by nasal polyps. With the progression of the disease, the polyps in the patient's nasal cavity gradually increase, and the nasal dysfunction gradually worsens. However, nasal polyps are not the end result of CRSsNP, and therefore the treatment strategies for these two types of CRSs may be different. Chronic rhinosinusitis with nasal polyps should be effectively treated as soon as possible after its occurrence. However, drug treatment can easily cause the patient's condition to recur, which makes the final treatment effect not good. As a result, surgery is the primary treatment option used in clinics for chronic sinusitis with nasal polyps. To relieve symptoms, nasal sinuses can be opened and polyp tissue in the nasal cavity removed [4–6]. Due to the limited surgical field of view in the past open sinus surgery, the sinus opening effect of some patients is not good, and it is easy to cause obvious trauma, which increases the risk of adverse reactions after surgery, which is relatively unfavorable to the prognosis. Nasal endoscope technology has been used more frequently recently during operations on individuals who have chronic sinusitis and nasal polyps. During the operation, the use of nasal endoscope can realize the illumination of the operation area, make the surgical field of view clearer, and realize the accuracy of the operation. Minimally invasive surgery can also be achieved [7–9]. Although significant progress has been made in the treatment of CRSwNP with the advent of functional endoscopic sinus surgery (FESS), a number of challenges remain, including the need for improved surgical techniques to minimize complications, facilitate recovery, and optimize long-term outcomes. Traditional extracorporeal approaches, although not commonly used today, still have potential advantages in certain cases. Therefore, in this study, two groups of patients with chronic sinusitis combined with nasal polyps, 80 patients in each group, who underwent conventional open sinus surgery and nasal endoscopic sinus surgery in the Department of Otorhinolaryngology of the hospital, from January 2020 to December 2022, were selected for a retrospective study of the clinical data in both groups. The aim was to compare the conventional in vitro method with FESS, focusing on specific outcomes that have not been explored in depth in previous studies, such as the effects on immune function and quality of life.

Materials and methods

General information

The study was conducted from January 2020 to December 2022. Patients with chronic rhinosinusitis and nasal polyps who underwent surgical treatment in the Department of Otorhinolaryngology of our hospital were retrospectively reviewed. A total of 160 patients were included, with 80 patients undergoing endoscopic sinus surgery (study group) and 80 patients undergoing traditional open sinus surgery (traditional surgery group). The study was approved by the Shantou Chenghai District People's Hospital [Ethical code No.2024-026-001]. Written informed consent was obtained from all participants after a detailed explanation of the study's purpose, procedures, potential risks, and benefits. To ensure patient confidentiality and privacy, all personal identifying information was anonymized and stored securely. Only the research team had access to the data, and all results were reported in an aggregated manner to prevent the identification of individual participants.

Sample selection and randomization

Patients were selected based on the inclusion and exclusion criteria outlined below. Using a computer-generated random number table, eligible patients were randomly assigned to either the study group (endoscopic sinus surgery) or the traditional surgery group (traditional open sinus surgery). No stratification was performed based on disease severity or polyp type; all eligible patients had an equal chance of being assigned to either group. This randomization method ensured that the allocation was unbiased and representative of the patient population.

Inclusion criteria

(1) Patients who met the diagnostic criteria of the European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS 2020), based on clinical symptoms, nasal endoscopy, and sinus CT scan results. (2) Presence of one or more of the following conditions warranting surgical intervention: ① Obvious anatomical abnormalities affecting the ostiomeatal complex or the drainage of each sinus; ② Nasal polyps affecting the ostiomeatal complex

or the drainage of each sinus; ③ Persistent symptoms despite at least 12 weeks of standardized medical treatment, including topical corticosteroids and a course of systemic corticosteroids; ④ Cranial, orbital and other complications occur; (3) Adults are over 18 years old and under 60 years old; (4) The clinical data have been completely preserved, with no missing cases.

Exclusion criteria

(1) previous history of otolaryngology surgery; (2) combined with coagulation dysfunction; (3) preoperative pathological diagnosis of malignant tumors in the nasal cavity; (4) cognitive impairment; (5) Combined with respiratory diseases.

Patient demographics

The clinical data of two groups of patients with chronic sinusitis and nasal polyps treated by different surgical methods were retrospectively analyzed. The age of the traditional surgery team ranged from 18 to 59 years old, with an average of (38.79 ± 5.16) years old. As for gender, there were 41 males and 39 females. The average length of time for chronic sinusitis was (1.02 ± 0.31) years, but it might last anywhere between 3 months and 2 years. There were 30 patients with type I (solitary sinusitis with solitary nasal polyps), there were 30 patients with type II (i.e. multiple sinusitis with multiple nasal polyps) and 20 patients with type III (i.e. general sinusitis with multiple nasal polyps); the age of the study group ranged from 18 to 58 years old, average (38.24 ± 5.37) years old, 43 males and 37 females, the course of chronic sinusitis ranged from 4 months to 2 years, with an average of (1.03 ± 0.30) years. 28 patients with sinusitis with single nasal polyps), 27 patients with type II (multiple sinusitis with multiple nasal polyps), and type III (sinusitis with multiple nasal polyps all over) 25 cases of patients. Age, sex, type of chronic sinusitis, and age data were compared between the two client teams, however there was no discernible statistical disparity between them ($P > 0.05$), which confirmed that the data of the general data of the two groups had a good matching degree, the results of follow-up studies are comparable.

Method

(1) Preoperative Preparation: All patients received fluticasone propionate nasal spray (GlaxoSmithKline Australia Pty Ltd., H20170361) for 7 days before surgery. Intramuscular injections of glucocorticoids and hemostatic agents were administered 3 days prior to surgery. Nasal lavage was performed twice daily under pressure.

(2) Surgical Techniques:

Traditional Surgery Group (Traditional Open Sinus Surgery): This technique primarily involves septoplasty, sphenoid sinusotomy, polypectomy, and possibly maxillary antrostomy. The goal is to improve nasal ventilation and sinus drainage by directly accessing and modifying the anatomical structures. Patients were positioned supine on the operating table and monitored with an electrocardiogram. The nasal cavity was infiltrated with 1% tetracaine (Jiangsu Jiuxu Pharmaceutical Co., Ltd., H20040583) and epinephrine solution (Beijing Yongkang Pharmaceutical Co., Ltd., H11020584). An incision was made on the convex surface of the nasal septum, and the mucoperichondrium and periosteum were separated. The nasal septum dilator was inserted to expose the sphenoid sinus, and the anterior wall of the sphenoid sinus was resected. Polyps in the nasal cavity were removed, and the maxillary sinus was expanded.

Study Group (Endoscopic Sinus Surgery): This technique employs the Messerklinger approach under endoscopic guidance. The focus is on precise removal of diseased tissue while preserving normal anatomical structures and mucosal function. The procedure includes polypectomy, ethmoidectomy, maxillary antrostomy, and sphenoidotomy as needed. Patients were positioned similarly and monitored with an electrocardiogram. The nasal cavity was infiltrated with 1% tetracaine (Jiangsu Jiuxu Pharmaceutical Co., Ltd. Word H20040583) and epinephrine solution (Beijing Yongkang Pharmaceutical Co., Ltd., National Pharmaceutical Approval Word H11020584). The Messerklinger technique was performed using a nasal endoscope. Under endoscopic guidance, polyps were removed using forceps, and the middle meatus was exposed. The ethmoid sinuses were opened, and the maxillary sinus ostium was expanded. The sphenoid sinuses were opened, and diseased tissue was cleared. The middle turbinate was preserved or partially resected based on the extent of disease. Septoplasty was performed if nasal septal deviation affected ventilation or sinus opening.

(3) Postoperative Management: After surgery, the maxillary sinus cavity was packed with iodophor gauze, and Vaseline gauze was inserted into the nasal cavity for 24 h. The surgical cavity was cleaned regularly, and appropriate antibiotics were administered. Dexamethasone (Fuzhou Neptune Fuyao Pharmaceutical Co., Ltd., Zhunzi H35021170) and gentamicin (China Resources Double Crane Pharmaceutical Co., Ltd., Zhunzi H11020687) irrigation was performed for 3 days. Patients were followed up weekly until full recovery.

Observation indicators

Compare the surgical situation, incidence of postoperative adverse reactions, postoperative recovery time, postoperative pain score, and serum inflammatory factor indicators between the two groups, and compare the immune function indicators, sleep status indicators, and

life quality grades of the two teams before and following the surgery.

Operation conditions and postoperative recovery: The lengths of the two teams' operations, intraoperative blood loss, postoperative mucosal recovery, nasal breathing, and hospital stays were all contrasted.

Adverse reactions: Between the two teams, the prevalence of nasal adhesion or nasal hematoma was contrasted, and the overall prevalence of problems was calculated.

Pain: Three evaluations of pain severity were conducted among patients (on the 1st, 2nd, and 3rd postoperative days). Postoperative pain was assessed using the Visual Analog Scale (VAS), with scores ranging from 0 (no pain) to 10 (unbearable pain). Pain scores were categorized as follows: 0–3 (mild pain), 4–6 (moderate pain), and 7–10 (severe pain). All patients received standardized postoperative pain management, including analgesic medications, to ensure comparability of pain measurements across both groups.

Serum inflammatory factors: On the morning of the 1st, 2nd, and 3rd postoperative days, venous blood collection was performed on the patient on an empty stomach, with 5 ml of blood collected from the anterior cubital vein. Blood samples were taken for centrifugation. The centrifugation speed, centrifugation time, and centrifugation radius were 3000 rpm, 10 min, and 10 cm, respectively. Serum was taken as the detection samples for C-reactive protein and Interleukin 6. The corresponding detection methods were immunoturbidimetry and enzyme-linked immunosorbent assay.

Immune function: Take serum samples and choose flow cytometry to detect the immune function indicators $CD3^+$, $CD4^+$ /$CD8^+$.

Sleep: Carry out monitoring work on the latency to fall asleep at night and the actual sleep duration in patients, and use polysomnography to monitor the sleep data of patients at night. At the same time, score the sleep quality of patients at night, using the Pittsburgh Sleep Quality Index (PSQI). The maximum grade on the scale, which is set at 21, is utilized for evaluation. The more severe the issues experienced during nighttime sleep, the higher the grade.

Quality of life was assessed using the WHOQOL-BREF questionnaire, which evaluates four domains: physical health (e.g., pain, energy levels), psychological well-being (e.g., mood, self-esteem), social relationships (e.g., personal and social interactions), and environment (e.g., physical safety, financial resources). Higher scores in each domain indicate better quality of life. This comprehensive assessment helps to understand the overall impact of the surgical interventions on patients' daily functioning and well-being.

Statistical methods

SPSS 22.0 was used in the statistical analysis of the data, the $\chi 2$ test was selected for the comparison of count data, and the t test was selected for the comparison of measurement data, and $P<0.05$ displayed that the disparity between the data was statistically meaningful.

Results

Comparison of operation and postoperative recovery between the two teams

The research team's surgery time was less than that of the traditional surgery team ($P<0.05$), and the blood loss during the operation was lower in the study team than the traditional surgery team ($P<0.05$). Comparing the study team and the traditional surgery team's times for postoperative nasal mucosa recovery, nasal ventilation, and hospitalization, the study team took less time overall ($P<0.05$). See Table 1, and Fig. 1:

Contrast of the two teams' rates of postoperative adverse effects

The values in the study team were lower than those in the traditional surgery team in terms of the overall incidence rate of postoperative adverse responses ($P<0.05$). See Table 2; Fig. 2:

Contrast of postoperative pain grades between the two teams

The results of the pain perception evaluation from the first to third postoperative days revealed that the three test grades in the study team were lower than those in the traditional surgery team ($P<0.05$). See Table 3; Fig. 3:

Contrast of serum inflammatory factor indexes between the two teams after operation

In comparison to the traditional surgery team, the study team's serum levels of C-reactive protein and

Table 1 Contrast of surgery and postoperative recovery between the two teams ($\bar{x} \pm s$)

Group	Operation time (min)	Intraoperative blood loss (ml)	Postoperative mucosal recovery time (d)	Nasal ventilation time (d)	Length of hospital stay (d)
Control group ($n=80$)	39.44 ± 5.15	34.65 ± 7.91	8.75 ± 2.38	6.28 ± 1.64	9.26 ± 1.89
Study group ($n=80$)	31.11 ± 4.20*	13.24 ± 3.40*	5.04 ± 1.93*	4.13 ± 0.92*	7.09 ± 1.27*

Note: * means $P<0.05$ contrasted with the controlling team

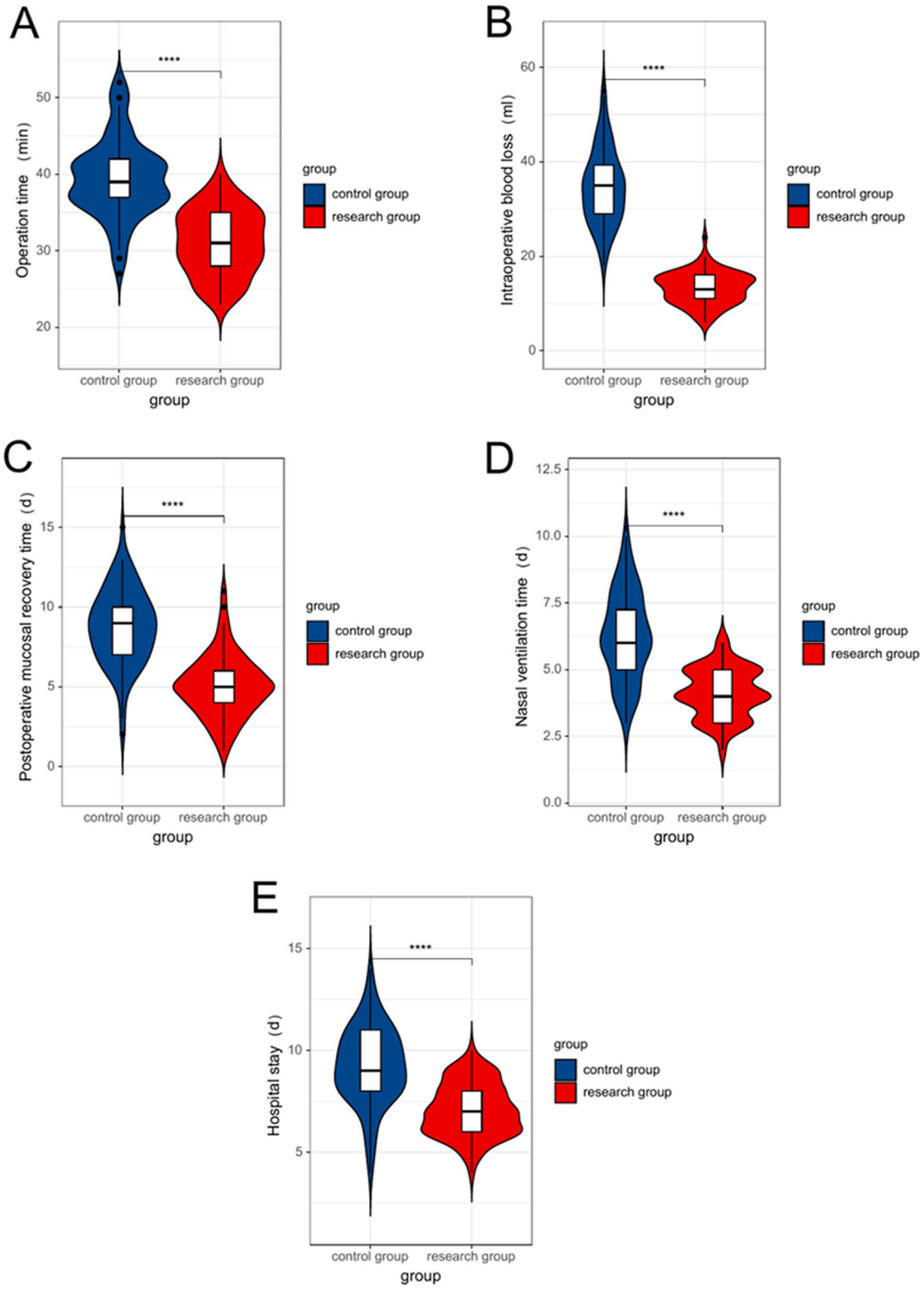

Fig. 1 Histogram of surgery and postoperative recovery in the two groups. Note: "****" means $P < 0.0001$

Table 2 Contrast of the incidence of postoperative adverse reactions in the two teams [n (%)]

Group	Number of cases	Nasal adhesions	Nasal hematoma	Total incidence
Control group	80	3(3.75%)	5(6.25%)	8(10.00%)
Research group	80	0(0%)	1(1.25%)	0(1.25%)*

Note: * means $P<0.05$ contrasted with the controlling team

Table 3 Contrast of postoperative pain grades between the two teams ($\bar{x} \pm s$)

Group	Pain score (points)		
	1st postoperative day	2d after operation	Postoperative 3d
Control group ($n=80$)	6.28 ± 1.62	5.70 ± 1.36	4.96 ± 1.35
Study group ($n=80$)	4.49 ± 1.21*	3.80 ± 1.22*	3.34 ± 0.83*

Note: * means $P<0.05$ contrasted with the controlling team

interleukin-6 decreased from the first to the third day following surgery ($P<0.05$). See Table 4; Fig. 4:

Contrast of immune function indicators between the two teams

When the two immune function indicators $CD3^+$ and $CD4^+/CD8^+$ were contrasted between the two teams after the operation, the detection data of the two immune function indicators were considerably lower than those

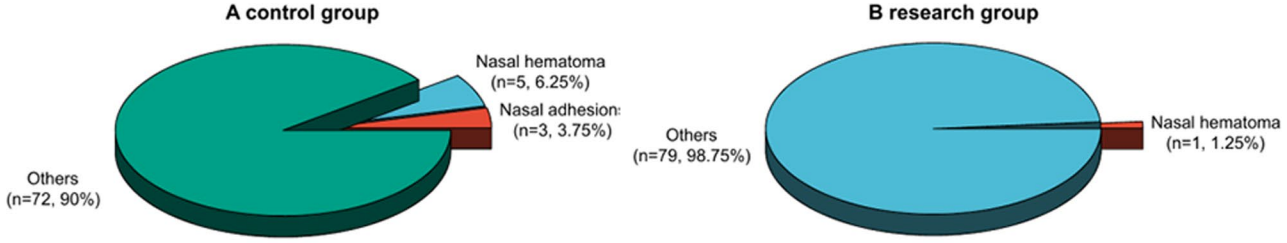

Fig. 2 The two teams' respective postoperative adverse response histograms

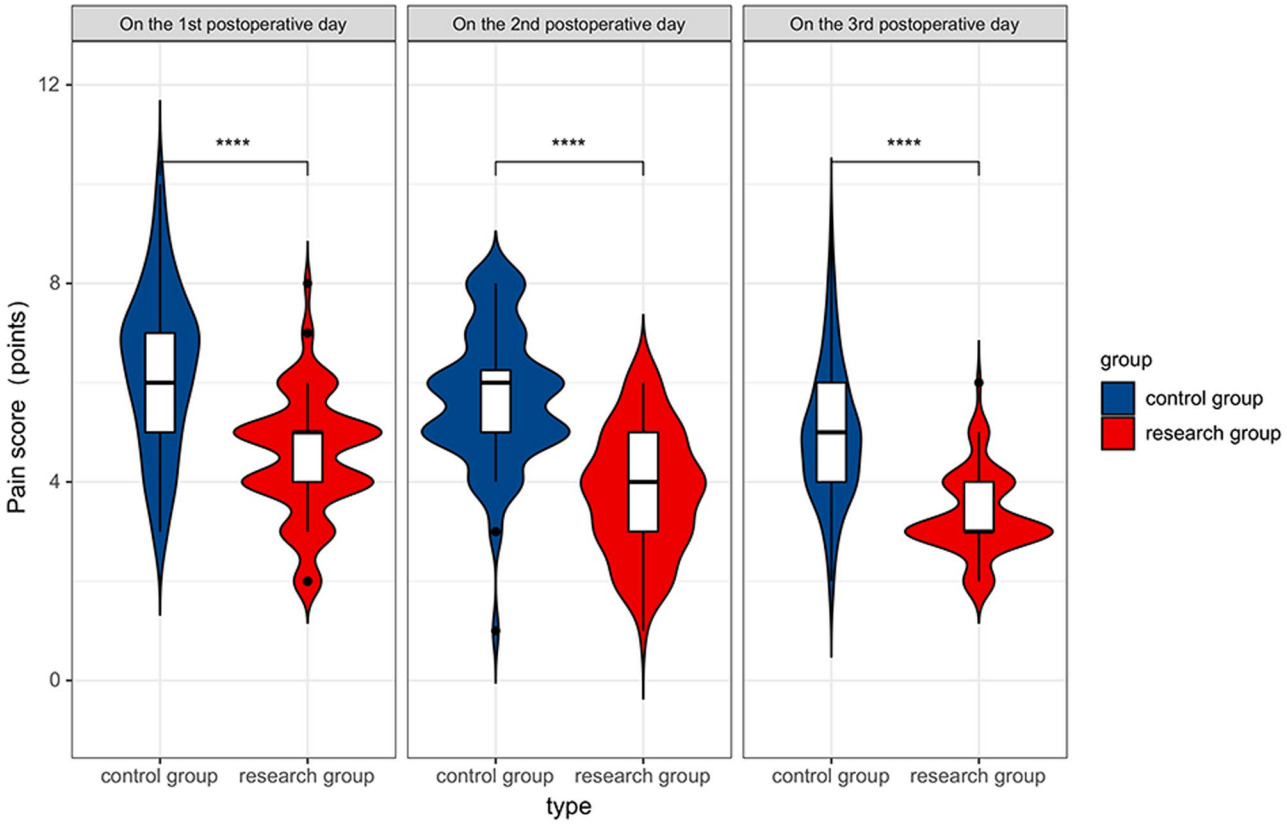

Fig. 3 Histogram of postoperative pain scores in the two groups. Note: "****" means $P<0.0001$

Table 4 Contrast of serum inflammatory factor indexes between the two teams after operation ($\bar{x} \pm s$)

Group	C-reactive protein (mg/L)			Interleukin-6 (ng/L)		
	1st postoperative day	2d after operation	Postoperative 3d	1st postoperative day	2d after operation	Postoperative 3d
Control group ($n=80$)	8.97 ± 1.25	7.93 ± 1.20	6.81 ± 1.34	26.54 ± 2.49	23.49 ± 2.25	21.07 ± 2.18
Study group ($n=80$)	7.32 ± 1.02*	6.41 ± 1.04*	5.27 ± 1.09*	23.56 ± 1.81*	20.34 ± 1.70*	18.12 ± 1.63*

Note: * means $P<0.05$ contrasted with the controlling team

before the operation in both teams. In the study team, $CD3^+$, $CD4^+/CD8^+$ were all higher, all $P<0.05$. See Table 5; Fig. 5:

Comparison of sleep status indicators between the two teams

The markers of nocturnal sleep monitoring and evaluation in the two teams were much better after the operation than they were prior to it. The research team's results from tracking actual sleep length and sleep latency were better than those from the traditional surgery team. The sleep quality evaluation grades of the team were lower, all $P<0.05$. See Table 6; Fig. 6:

Comparison of life quality grades between the two teams

The grades of the four aspects of life quality in the two teams after the operation greatly improved from those before the operation. The study team outperformed the traditional surgery team in terms of each category of life quality when grades were compared between the teams, all $P<0.05$. See Table 7; Fig. 7:

Discussion

An infectious, inflammatory condition known as chronic sinusitis affects the sinuses and nasal cavity. The main pathological change is purulent inflammatory infection. After the onset, there are multiple sinuses in the patient's nasal cavity that have inflammatory reactions, which will lead to nasal congestion and runny nose. The sense of smell will also be affected, and the risk of epistaxis and hypoxic reaction will be increased, which will bring great harm to the patient's physical and mental health [10–12]. Nasal polyps are a common complication in the long course of the disease in patients with chronic sinusitis. The occurrence of this complication will aggravate the condition of patients with chronic sinusitis, and the volume of polyp tissue in the nasal cavity will gradually increase, resulting in patients with sinusitis. Clients' life quality significantly declines as a result of the worsening of their symptoms, which seriously interfere with their everyday activities [13–15]. Therefore, after the occurrence of chronic sinusitis with nasal polyps, it is necessary to take active treatment methods in patients clinically.

Our study compared traditional open sinus surgery with endoscopic sinus surgery in the treatment of CRSwNP. The results demonstrated that endoscopic sinus surgery was superior in terms of reduced operative time, intraoperative blood loss, and postoperative complications. These findings are consistent with the current understanding that endoscopic techniques offer better visualization and precision, leading to improved surgical outcomes. Additionally, endoscopic surgery allows for better preservation of normal anatomical structures and mucosal function, which may contribute to the reduced incidence of postoperative complications and faster recovery. While our study focused primarily on short-term outcomes such as pain reduction, improved nasal function, and quality of life, long-term follow-up data are crucial to assess the durability of these benefits. Preliminary long-term data from our ongoing study indicate that the benefits of endoscopic surgery, including reduced recurrence rates of nasal polyps and sustained improvements in nasal function, persist for at least 12 months postoperatively. However, further long-term studies are needed to fully evaluate the durability of these outcomes and identify any late complications. Long-term follow-up is essential to ensure that the initial benefits of surgery are sustained and to monitor for any potential long-term adverse effects.

In the past, the traditional open sinus surgery was the main method of operation for chronic sinusitis with nasal polyps. This kind of surgery can relieve symptoms and improve nasal function by cutting the nasal septum, opening the sphenoid sinus, and removing polyps in the nasal cavity. Due to the relatively special anatomical structure of the nasal cavity of the human body, the surgical field of view is limited by the anatomical structure of the nasal cavity, resulting in insufficient openness of the surgical field of view and a narrow surgical field. The surgeon is easily affected during the operation, and some patients still have sinuses after surgical treatment. In the case of poor opening of the mouth, the improvement effect of the nasal cavity function is not ideal, and this traditional open sinus surgery will cause a certain degree of trauma to the patient's nasal cavity, a lot of blood loss during the operation, and postoperative nasal hematoma and nasal adhesions are prone to occur. The repair of the nasal mucosa and nasal ventilation performance following surgery are negatively impacted by adverse responses, which is detrimental to the clients' prognosis [16, 17].

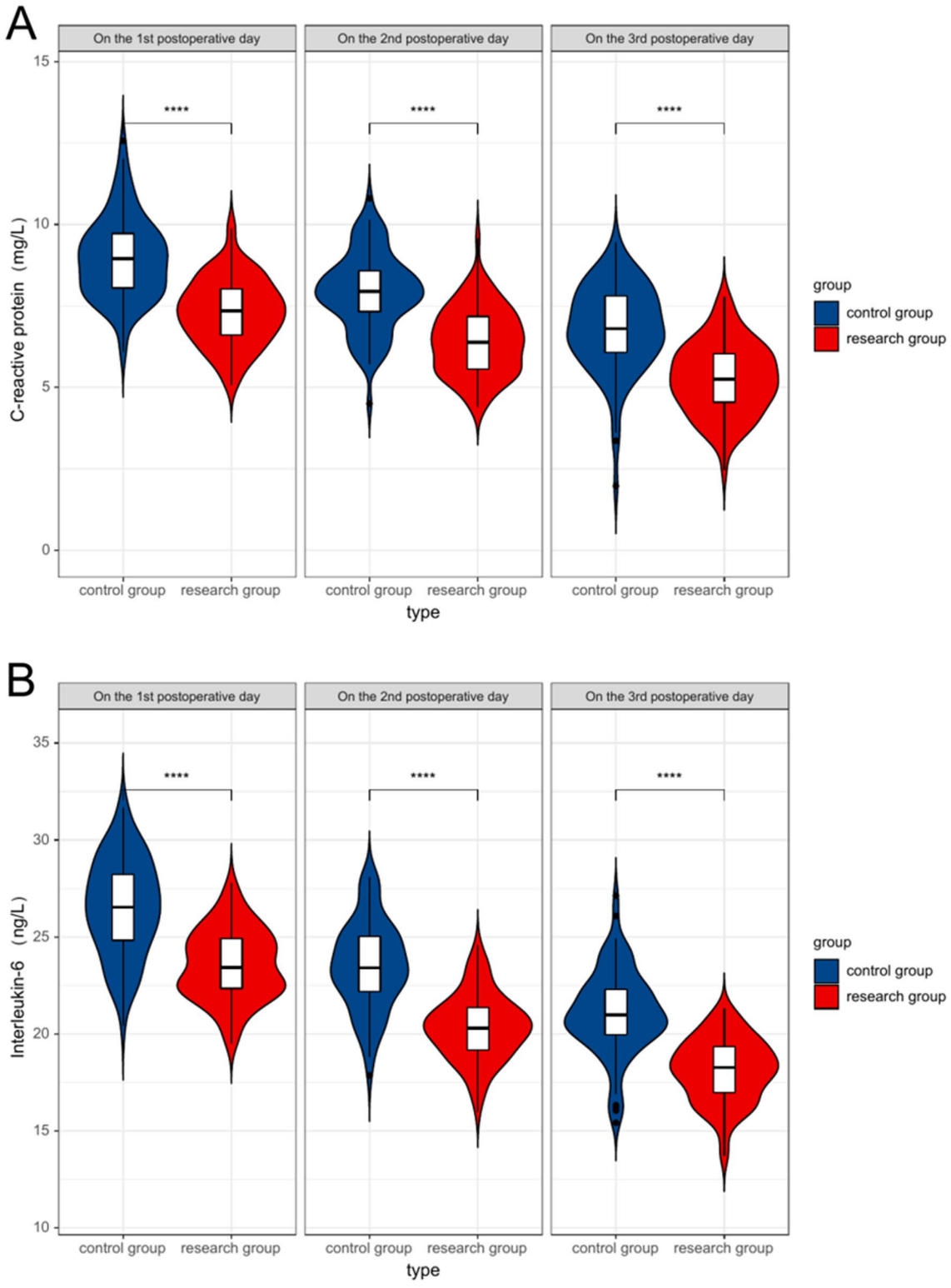

Fig. 4 Histogram of serum inflammatory factor indexes in the two teams after operation. Note: "****" means $P < 0.0001$

Table 5 Contrast of immune function indicators between the two teams ($\bar{x} \pm s$)

Group	Time	CD3 $^+$ (%)	CD4 $^+$ /CD8 $^+$
Control group ($n=80$)	before surgery	45.40 ± 2.69	1.85 ± 0.45
	after surgery	39.08 ± 2.12$^{\#}$	1.09 ± 0.28$^{\#}$
Study group ($n=80$)	before surgery	45.58 ± 2.78	1.83 ± 0.44
	after surgery	41.91 ± 2.34$^{\#*}$	1.41 ± 0.50$^{\#*}$

Note: $^{\#}$ is $P<0.05$ contrasted with prior to operation, *is $P<0.05$ contrasted with the controlling team

Table 6 Contrast of sleep status indicators between the two teams ($\bar{x} \pm s$)

Group	Time	Latency to fall asleep (min)	Actual sleep time (h)	Sleep quality score (points)
Control group ($n=80$)	before surgery	64.44 ± 12.66	4.20 ± 1.16	15.21 ± 2.35
	after surgery	42.63 ± 8.72$^{\#}$	6.79 ± 1.04$^{\#}$	12.36 ± 1.60$^{\#}$
Study group ($n=80$)	before surgery	64.05 ± 12.59	4.23 ± 1.19	15.11 ± 2.36
	after surgery	33.81 ± 7.94$^{\#*}$	7.81 ± 0.96$^{\#*}$	10.49 ± 1.31$^{\#*}$

Note: $^{\#}$ is $P<0.05$ contrasted with prior to operation, *is $P<0.05$ contrasted with the controlling team

With the continuous development of minimally invasive technology, nasal endoscope is gradually applied in the operation of chronic sinusitis with nasal polyps. As an optical device, nasal endoscope equipment is equipped with a lighting system. The auxiliary lighting function enables the surgeon to detect and clarify the situation in the narrow nasal cavity, and has the function of zooming in and displaying, so that the surgeon can zoom in on the operation field under the sufficient lighting conditions of the nasal endoscope, so as to display it more intuitively. The structure inside the nasal cavity is conducive to improving the accuracy of the surgeon during the operation, ensuring the effective opening of the sphenoid sinus and resection of polyp tissue during the operation, and at the same time, it can also prevent the surgeon from damaging blood vessels and nerves due to the limited operative field, and reduce the trauma caused by surgical procedures to patients [18–20]. Nasal endoscopic surgery is a new type of trauma technique that has the advantages of minimal trauma, clear field of view, and minimal bleeding. It provides clear exploration of the patient's lesion site, while using surgical forceps to protect their mucosal tissue, significantly improving the accuracy of the surgical operation, reducing trauma and bleeding, ensuring smooth drainage and ventilation of the sinuses, Improve the mucosal cilia clearance function, completely remove the inflammatory tissue in the nasal cavity and sinuses, improve the mucosal inflammatory response, ensure the early recovery of physiological function of the affected mucosa, clear the lesion tissue, and avoid complications.

The use of nasal endoscopic equipment in the diagnosis and treatment of disorders of the nasal cavity has gradually grown in recent years. In order to explore the role of nasal endoscopic equipment in the operation of patients with chronic sinusitis and nasal polyps, in this study, two groups of chronic Sinusitis patients with Nasal polyp who received traditional open sinus surgery and endoscopic sinus surgery were selected to carry out a retrospective study. After comparing the relevant data after the implementation of the two groups of surgical programs, the following results were obtained: Regarding the time-consuming operation, the study group compared with the traditional surgery group took less time ($P<0.05$), and the blood loss during operation was lower in the study group

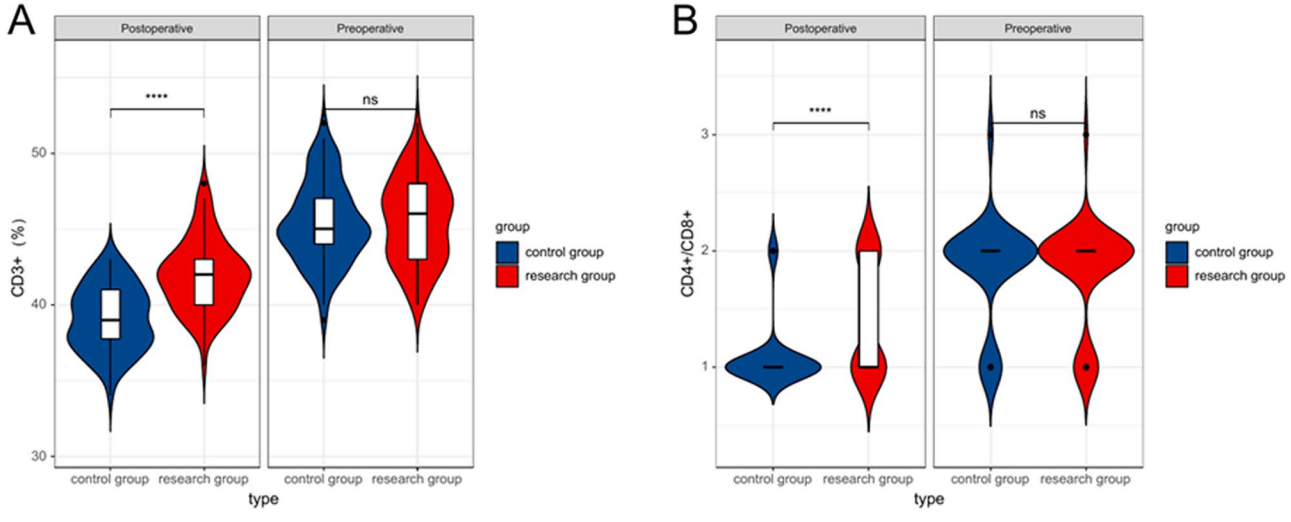

Fig. 5 Histogram of immune function indicators in two groups. Note: "****" means $P<0.0001$; "ns" means $P>0.05$

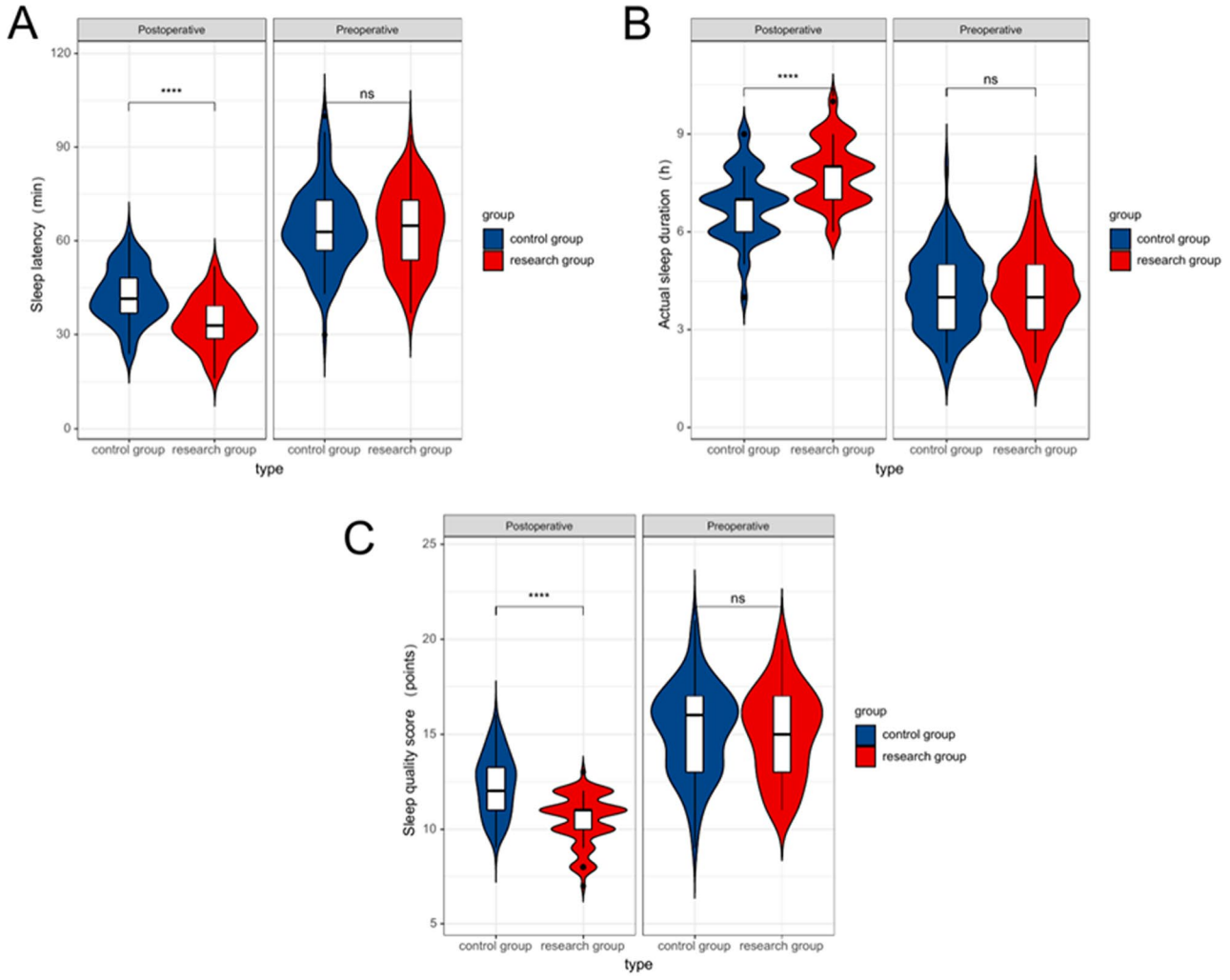

Fig. 6 Histogram of sleep status indicators in the two teams. Note: "****" means $P < 0.0001$; "ns" means $P > 0.05$

Table 7 Contrast of life quality grades between the two teams ($\bar{x} \pm s$, points)

Team	Time	Physiological	Psychology	Environment	Social relationship
Control team ($n=80$)	Prior to surgery	74.23 ± 5.16	73.59 ± 5.17	74.48 ± 5.37	74.39 ± 5.05
	Following surgery	82.88 ± 6.43#	82.36 ± 6.16#	83.28 ± 5.24#	83.18 ± 5.42#
Study team ($n=80$)	Prior to surgery	74.64 ± 5.14	73.91 ± 5.12	74.80 ± 5.49	74.75 ± 5.21
	following surgery	89.73 ± 6.20#*	89.08 ± 6.08#*	90.04 ± 5.64#*	89.98 ± 5.73#*

Note: # is $P < 0.05$ contrasted with prior to operation, * is $P < 0.05$ contrasted with the controlling team

than that in the traditional surgery group ($P < 0.05$); in terms of postoperative adverse reactions, the total incidence rate was lower in the study group than in the traditional surgery group ($P < 0.05$); When the study team and the traditional surgery team's postoperative nasal mucosa recovery, nasal breathing, and hospitalization times were contrasted, the study team took less time ($P < 0.05$); from 1d to 3d postoperatively, compared with the traditional surgery group, the scores of the pain assessment in the research group were lower ($P < 0.05$), and the values of serum C-reactive protein and interleukin-6 in the research group were lower ($P < 0.05$); After the operation, the detection data of the two indicators of immune function $CD3^+$ and $CD4^+/CD8^+$ in the two groups were significantly lower than those before the operation, and the two immune function indicators were compared between the groups. In the study group, $CD3^+$, $CD4^+/CD8^+$ were all higher, all $P < 0.05$. The above research results show that nasal endoscopic surgery can effectively realize the minimally invasive operation of chronic sinusitis with nasal polyps, reduce the trauma caused by the operation to the patient, reduce the amount of blood loss during the

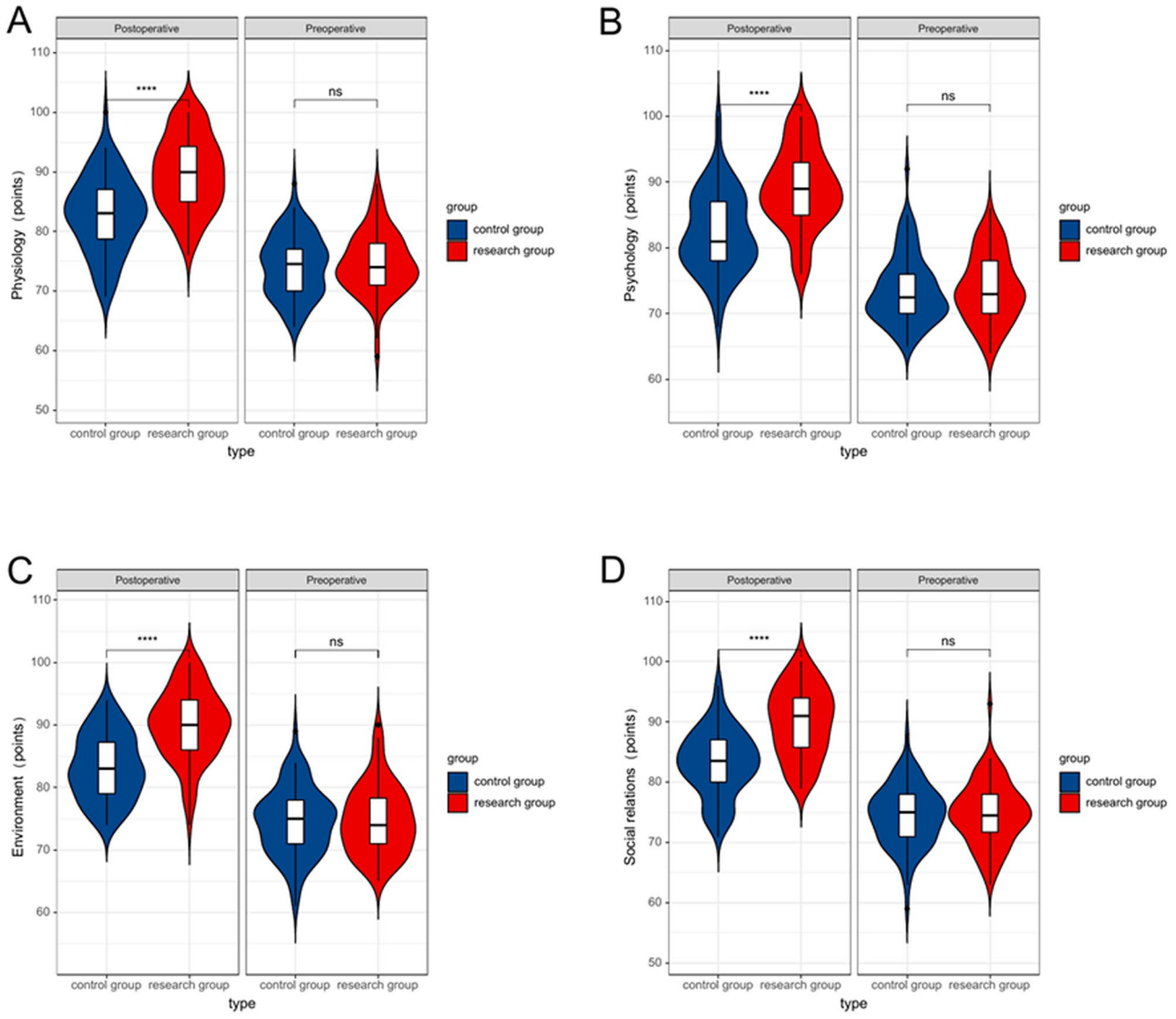

Fig. 7 Histogram of quality of life scores in the two teams. Note: "****" means $P < 0.0001$; "ns" means $P > 0.05$

operation, protect the immune function of the patient, and prevent the patient from being injured during the operation. Significant pain and inflammatory response appear after surgery, reducing the risk of adverse events after surgery and speeding up postoperative recovery.

After the occurrence of chronic sinusitis with nasal polyps, the patient's nasal cavity function is impaired, accompanied by symptoms of nasal congestion and runny nose, which affect his sleep and quality of life, which is not optimistic. The impact of the two surgical procedures on individuals with chronic sinusitis and nasal polyps' ability to sleep better and live better was also examined in this study. In comparison to the traditional surgery team, the research team had higher grades in the four categories of life quality and better monitoring results for sleep latency and real sleep length. The research team also grades less poorly on sleep quality rating. The scores were all higher, all $P < 0.05$, indicating that the sleep and quality of life of patients with chronic sinusitis with nasal polyps were improved after traditional sinus open surgery and endoscopic sinus surgery, but endoscopic sinus surgery had no effect on sleep. The effect of improving the quality of life is obviously better than that of traditional sinus open surgery. The accuracy enables it to accurately complete the operation of opening the sinuses and removing polyps, thereby better improving the function of the nasal cavity and reducing the adverse effects of nasal dysfunction on the patient's sleep and quality of life.

In addition to surgical interventions, pharmacological management plays a significant role in the treatment of CRSwNP. Medical therapies, such as topical corticosteroids and a course of systemic corticosteroids, are mandatory before considering surgical intervention. Biologics, such as anti-IL-5 or anti-IL-4Rα agents, have

shown efficacy in reducing polyp size and improving symptoms in patients who fail to respond to conventional medical therapy, as reported in the EPOS guidelines and European studies. These agents are indicated in cases of symptomatic failure after surgery. Future research should focus on optimizing multimodal treatment strategies that combine surgical and medical interventions, including the use of biologics, to achieve the best outcomes for patients.

Conclusion

In conclusion, our study suggests that endoscopic sinus surgery has advantages over conventional open sinus surgery in terms of reduced operative time, intraoperative blood loss, and postoperative complications. However, these two different surgical techniques should be interpreted with caution when comparing them because they have different surgical goals and approaches. Our study contributes to the existing body of knowledge by comparing the conventional in vitro method and FESS in detail, focusing on outcomes that have not been extensively studied. Specifically, our comprehensive assessment of immune function and quality of life provides a more comprehensive view of the impact of these surgical techniques on patient health. These findings suggest that while FESS remains the gold standard, traditional methods still have a role to play in specific clinical situations. For example, the traditional approach may be more advantageous in cases with severely deformed anatomy or extensive lesions that require a more direct surgical view. Although our study provides valuable insights into the comparative efficacy of conventional external surgery and FESS, some limitations should be recognized. The sample size was relatively small, which may limit the generalizability of our findings. Therefore, future studies should focus on larger sample sizes to validate our findings. In addition, further studies are needed to optimize surgical techniques and to explore the role of multimodal treatment strategies, including the use of biologics, in the treatment of CRSwNP, taking into account long-term efficacy and patient-centered measures to improve patient satisfaction and minimize postoperative recurrence rates.

Abbreviations

VAS	Visual Analog Scale
PSQI	Pittsburgh Sleep Quality Index

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Author contributions

SWC is responsible for the guarantor of integrity of the entire study, study concepts & design, definition of intellectual content, literature research, clinical studies, experimental studies, data acquisition & analysis, statistical analysis, manuscript editing & review; CBL is responsible for the guarantor of integrity of the entire study, study design, definition of intellectual content, literature research, clinical studies, experimental studies, data acquisition, statistical analysis, manuscript preparation & editing & review; ZHF is responsible for the study concepts & design, definition of intellectual content, literature research, clinical studies, experimental studies, data acquisition & analysis, statistical analysis, manuscript preparation & editing & review. All authors read and approved the final manuscript.

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Data availability

All data generated or analysed during this study are included in this. Further enquiries can be directed to the corresponding author.

Declarations

Ethics approval and consent to participate

The study was approved by the Shantou Chenghai District People's Hospital [Ethical code No.2024-026-001]. Written informed consent was obtained from all individuals included in this study.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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