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Comparative Analysis on the Curative Effect of Endoscopic Submucosal Dissection and Mucosal Resection in the Treatment of Gastric Neuroendocrine Tumor

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Abstract: ***Objective:*** To study the therapeutic effect of endoscopic submucosal dissection and mucosal resection on gastric neuroendocrine tumor. ***Methods:*** A hundred patients with gastric neuroendocrine tumor that were treated in the Affiliated Hospital of Chifeng University from January 2016 to May 2021 were randomly selected for this research. They were divided into two groups, which were the control group (endoscopic mucosal resection) and the study group (endoscopic submucosal dissection), by the digital table method. The curative effects of the two groups were observed and compared. ***Results:*** Before operation, there were no significant differences in serum CgA, TNF-α, and IL-6 between the two groups, $p > 0.05$. After surgical treatment, the operation time and hospital stay of the patients in the study group were shorter than those in the control group, the amount of surgical bleeding was also less compared to the control group, and the complete tumor resection rate was higher than that in the control group ($p < 0.05$); the levels of IL-6 and CgA of the study group were lower than those in the control group, while the levels of TNF-α were higher than those of the control group, $p < 0.05$; the postoperative complication rate of the study group was lower than that of the reference group ($p < 0.05$). ***Conclusion:*** Endoscopic submucosal dissection is more effective for gastric neuroendocrine tumors. The resection rate of the tumor is high, and the operation risk is low.

Keywords: Endoscopic submucosal dissection; Endoscopic mucosal resection; Gastric neuroendocrine tumor; Clinical efficacy

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1. Introduction

Gastric neuroendocrine tumor is a common neuroendocrine tumor, which usually occurs as an epithelial tumor of the gastrointestinal tract. According to various sources, most of these tumors are derived from neuroendocrine cells, which can promote the synthesis of peptide hormones, they contain neuroendocrine markers. According to clinical tumor research, the structure of gastric neuroendocrine tumors is single and highly heterogeneous, the speed of the tumor development is relatively slow, and the invasiveness is less compared to other tumors, such as gastric cancer. However, it would still cause great harm to the health of the affected patients with the continuous development of the disease; thus, early treatment is extremely important [1,2]. At this stage, the preferred surgical treatment for this disease is via endoscopic surgery. Endoscopic submucosal dissection and endoscopic mucosal resection can achieve certain curative effects,

but there are differences in specific advantages. In regard to that, this research is a comparative analysis on endoscopic submucosal dissection and mucosal resection.

2. Materials and methods

2.1. Materials

This research included 100 patients with gastric neuroendocrine tumors that were treated in the Affiliated Hospital of Chifeng University from January 2016 to May 2021. The patients were divided into two groups by using the digital table method. The control group comprised of 50 patients, where the proportion of men to women was 27:23, age ranging between 40 to 65 years old, with an average age of 48.25 ± 4.36. The course of the disease was from 1 to 4 years, with an average of 2.64 ± 0.45 years, and the diameter of the tumor was 21.51 ± 2.57 cm. The study group also comprised of 50 patients, where the proportion of male to female was 26:24, age ranging from 41 years old to 66 years old, with a mean age of 48.17 ± 4.27. The course of the disease was 1 to 3 years, with an average of 2.67 ± 0.47 years, and the diameter of the tumor was 21.49 ± 2.51 cm. There was no significant difference in the above data calculated by statistical software ($p > 0.05$).

The inclusion criteria of the research subjects were as follows: (1) confirmation that the standards of a gastric neuroendocrine tumor had been met after a clinical comprehensive examination [3]; (2) lesions were limited to submucosal infiltration; (3) all were in accordance with the indications of surgical treatment; (4) all patients in this study were informed and had signed the study consent form; (5) approved by the hospital ethics committee. The exclusion criteria were as follows: (1) tumor metastases or lymph node metastasis; (2) contraindications of surgical treatment; (3) severe mental illness and cognitive impairment; (4) coagulation dysfunction or other basic diseases; (5) unable to tolerate treatment or would not cooperate with the study.

2.2. Methods

Endoscopic mucosal resection was performed for patients in the control group. After anesthesia, endoscopy was carried out to explore the base of the lesion in detail and for full exposure of the lesion. A mixture of glycerol fructose, methylene blue, and epinephrine was injected around the lesion, and then the lesion was carefully check for a positive lifting sign. With a positive lifting sign, a snare device was used along with electrocoagulation knife resection. In the case of a relatively large lesion, it was removed by process. After successful excision, electrocoagulation with thermal biopsy forceps was carried out to close the wound.

Endoscopic submucosal dissection was performed for patients in the study group. General anesthesia was given after endotracheal intubation, then the edge of the lesion was observed with endoscopy. Electrocoagulation marks were made at 0.5 cm from the edge of the lesion with dual knife. Then, multipoint submucosal injections were administered around the lesion. The mixed solution included methylene blue trihydrate, glycerol fructose, and adrenaline. A dose of 3-6 ml was injected each time to ensure that the lesion was fully lifted and the muscle layer was separated. The lesion was then cut circumferentially from the above lesion marker point with the help of the dual knife, and the submucosal area was processed by a hook knife along the direction of the muscularis propria. After stripping the tumor completely, it was sent to the laboratory for pathological biopsy to observe the residue of the tumor at the base and cutting edge. If there was a perforation, it was clamped with a titanium clip. The wound was then treated with hot biopsy forceps.

2.3. Observation indexes

The surgical treatment indexes of the two groups were observed and compared. The indexes included

operation time, surgical bleeding, hospital stay, and complete tumor resection rate. Each patient's venous blood on empty stomach was drawn before and after the surgical treatment. After centrifugation, the supernatant was stored in a cold storage for later use. IL-6, TNF-α, and serum CgA were detected by enzyme-linked immunosorbent assay. Complications such as perforation, subcutaneous swelling, and bleeding were observed after the surgery.

2.4. Statistical analysis

Statistical Package for the Social Sciences (SPSS) version 23.0 was used to process and analyze the data. The data were tested using t-test and chi-square (X2). They were expressed in ($\overline{x}$ ± s) (n /%). $p < 0.05$ indicated a difference in the data.

3. Results

3.1. Surgical indexes

Comparing the surgical indexes between the two groups, the operation time and hospital stay of the study group were shorter than those of the control group; the amount of surgical bleeding was also less in the study group compared to the control group; the tumor resection rate of the study group was higher than that of the reference group ($p < 0.05$) (**Table 1**).

Table 1. Comparison of surgical indexes ($\overline{x}$ ± s)

Group	N	Operation time (minutes)	Surgical bleeding in volume (ml)	Length of stay (days)	Tumor resection rate (%)
Control group	50	32.25±2.54	21.14±1.52	5.41±1.39	41 (82.00)
Study Group	50	29.17±1.85	20.07±1.02	4.17±1.08	48 (96.00)
t		6.9309	4.1333	4.9812	5.0051
P		0.0000	0.0001	0.0000	0.0252

3.2. Improvement of serum biochemical indexes

There were no significant differences in the levels of IL-6, TNF-α, and CgA between the two groups before treatment, $p > 0.05$. After surgical treatment, the levels of IL-6, TNF-α, and CgA of both the groups decreased, but the levels of IL-6, TNF-α, and CgA of the study group were lower than those of the control group, $p < 0.05$ (**Table 2**).

Table 2. Comparison of IL-6, TNF-α, and CgA levels before and after surgical treatment ($\overline{x}$ ± s)

Group	IL-6 (ng/L)		TNF-α (ng/L)		CgA (mg/ml)	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Control group (n = 50)	13.51±2.34	7.05±1.41	92.14±14.41	31.15±4.13	96.54±14.38	67.54±9.85
Study group (n = 50)	13.49±2.41	6.51±1.02	92.22±14.37	29.84±4.05	96.47±14.42	47.34±9.01
t	0.0421	2.1941	0.0278	2.1196	0.0243	10.6999
p	0.9665	0.0306	0.9779	0.0366	0.9807	0.0000

3.3. Postoperative complications

The complication rate of the study group was lower than that of the control group ($p < 0.05$) (**Table 3**).

Table 3. Comparison of the incidence of complications between the two groups ($\overline{x} \pm s$)

Group	N	Bleeding	Perforation	Subcutaneous emphysema	Total incidence rate
Control group	50	5	2	3	10 (20.00)
Study Group	50	1	0	1	2 (4.00)
t					6.0606
p					0.0138

4. Discussion

With the rapid progress of medical technologies, the endoscopic technology is gradually applied in clinical treatment. Gastric neuroendocrine tumor, as a common type of neuroendocrine tumors, needs to be treated as soon as possible to prevent distant metastases or lymph node metastasis, which would cause greater harm [4].

Endoscopic mucosal resection is a common endoscopic surgery. Compared with traditional open surgery, this method results in lower trauma and postoperative complications. The effectiveness and safety of the surgery have been confirmed through clinical practice [5]. Endoscopic submucosal dissection is also one of the endoscopic surgical methods. This method can be used for direct observation with the help of endoscope. Special instruments can be used for accurate dissection of tumor lesions and mucosa, which can completely remove lesions and prevent disease recurrence. However, there are few reports on the specific advantages and disadvantages of endoscopic mucosal resection and submucosal dissection.

The results from this study showed that the surgical indexes of the study group were significantly superior compared to those of the control group. In addition, the degree of improvement of serum CgA was significantly better than that of the control group. CgA is a soluble acidic protein found in the adrenal medulla and is mainly distributed in neuroendocrine cells. It is a relatively common tumor marker. Clinical studies have shown that the expression of serum CgA would be high in patients with gastric neuroendocrine tumor, and there is a certain correlation between distal tumor metastases and serum CgA levels. In addition, endoscopic submucosal dissection can effectively and thoroughly remove the lesion and reduce the serum CgA level, thus having a more significant therapeutic effect [6,7].

In conclusion, endoscopic submucosal dissection is more effective in the treatment of gastric neuroendocrine tumor, which can be used as an option for clinical treatment.

Disclosure statement

The authors declare that there is no conflict of interest.

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