

Evaluation of Complications in Patients with Malignant Sinus Tumors (Cross-Sectional Study)

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Abstract: Background: Malignant sinonasal tumors represent the most uncommon tumors that involve many sub-tissues and can be treated by endoscopic resection, open resection, or other methods. **Objective:** This study was contributed to assess postoperative complications in patients with malignant sinus tumors. **Patients and methods:** A cross-sectional study was conducted targeting clinical data of patients before, during and after surgery for 90 patients with malignant sinonasal tumors. This study covered all clinical and demographic data collected from different hospitals in Iraq for a period between July 17, 2022, to February 11, 2023. This study determined the complication rate, pain rate, and postoperative risk factors affecting patients with malignant sinonasal tumors. **Results:** Our results found that the rate of patients who underwent laparoscopic resection was 80%, while the rate of patients who underwent open resection was 20%. The duration of the surgical procedure was (180.25 ± 34.68) minutes, the volume of bleeding during the operation, ml, was 306.07 ± 70.58 , the percentage of patients who There were five patients exposed to bleeding, the length of stay in the hospital was (250.62 ± 16.05) minutes, the duration of recovery was (12.68 ± 4.70) days, admission to the intensive care unit was 4 cases, the duration of follow-up (months) was 2.40 ± 0.68 cases, the average was Complications for patients who underwent laparoscopic resection surgery were 4 cases, and the complication rate for patients who underwent open resection surgery was 7 cases. **Conclusion:** This study indicated that laparoscopic resection surgery is the optimal surgical procedure in reducing the rate of complications and improving the quality of life of patients.

Keywords: Malignant sinus tumors; Postoperative complications; Quality of life; and Survival-life.

INTRODUCTION

Malignant tumors of the nose and paranasal cavities are relatively uncommon, representing between 0.2% and 0.8% of malignant tumors of the body and approximately 3% of tumors of the upper aerodigestive tract [Lund, V. J. *et al.*, 2010; Thawani, R. *et al.*, 2023]. They are more frequent in men than in women in a ratio of 2:1; they usually occur between the fifth and seventh decade of life, and among the predisposing factors, occupational exposure to certain substances is important, with this antecedent being found in up to 40% of cases [Sjöstedt, S. *et al.*, 2018]. These include nickel, chromium, isopropyl oil, volatile hydrocarbons, and organic fibers found in the wood, footwear, and textile industry. Nickel has been associated with a 250-fold increase in the chances of developing squamous cell carcinoma, with a latency of 18 to 36 years; coarse wood dust has been linked to a higher incidence of ethmoid adenocarcinoma, while fine wood dust to squamous cell carcinomas, anaplastic and adenocarcinomas. [Wang, E. W. *et al.*, 2019]

In recent years, we have seen some changes both in the diagnosis and in the therapeutic management of nasal fossa and paranasal sinus tumors [Amaral, M. N. *et al.*, 2022]. As for the diagnosis, the use of endoscopes and the improvement of radiological images has allowed the identification of these

tumors earlier and more accurately [Lydiatt, W. M. *et al.*, 2017]. As for treatment, advances in skull base surgery and craniofacial reconstruction techniques, with the use of free microvascular flaps, have led to significant improvements in the postoperative morbidity of these patients [Economics, ASoACo, 2020]. Likewise, the use of intensity-modulated radiotherapy (IMRT) allows the optimization of doses on the tumor while respecting healthy tissues, also contributing to lower morbidity. Survival rates have been increasing in published works in recent years. [Suh, J. D. *et al.*, 2013; Hanna, E. *et al.*, 2009]

However, these are still low, with 5-year survivals of 30 to 60% in the best cases. Some of the causes of this high mortality are the rarity of these tumors (they account for approximately 3% of upper airway tumors), the similarity in presentation symptoms with other benign pathologies, and the ability to spread easily to neighboring structures affecting noble areas [Hadad, G. *et al.*, 2006; Ganly, I. *et al.*, 2005]. This means that these tumors are often diagnosed in advanced stages. They are more frequent in males and have a peak incidence between 50 and 59 years of age [Abdelmeguid, A. S. *et al.*, 2020]. Its most common location is the maxillary sinus, followed

by the ethmoid, sphenoid, and frontal sinuses. [Beswick, D. M. *et al.*, 2021]

The consultation for nasosinus disease in otolaryngology represents between 20% and 40% of the total, which, added to the fact that these tumors grow within the bony limits of the paranasal sinuses, they are often asymptomatic until they erode and invade the adjacent structures, and their initial symptoms are, most of the time, identical to those caused by inflammatory diseases of the area, cause that in a high percentage they are diagnosed late, usually presenting in advanced stages, which is reflected in poor healing (50% or less). [Ziai, W. C. *et al.*, 2003; Jerath, A. *et al.*, 2018]

PATIENTS AND METHODS

We conducted a cross-sectional study of clinical, surgical, and demographic data for 90 patients with malignant sinus tumors, whose ages ranged between 20 - 60 years, which were collected from different hospitals in Iraq for a period between July 17, 2022, and February 11, 2023. These demographic data included age, gender, and index Body mass, smoking factor, comorbidities, symptoms, ASA classification, education level, marital status, employment status, and income level. This study showed the stages and locations of malignant sinonasal tumors identified in the nasal cavity, maxillary sinus, paranasal sinuses, and olfactory nerve, which were distributed among patients.

Regarding intraoperative and postoperative outcomes, this study identified surgical data for patients who underwent both laparoscopic resection, which included 72 patients, and open resection, which included 18 patients. In addition, this study determined the intraoperative and postoperative clinical outcomes of patients with malignant sinonasal tumors in terms of endoscopic resection, open resection, operating time, intraoperative bleeding volume, bleeding rate, length of hospital stay, recovery time, intensive care unit admission, follow-up time, and mortality. Also, we evaluated the postoperative pain scores of patients with malignant sinonasal tumors by VAS within seven days after surgery. In addition, this study determined the clinical consequences of postoperative complications in terms of bleeding, infection, airway narrowing, cerebrospinal fluid, scarring, and nerve damage.

This study recorded the postoperative survival rate—the lives of patients with malignant sinonasal tumors over 60 days. Also, we performed a multivariate analysis of the risk factors affected in patients with malignant sinonasal tumors. The clinical data of patients with malignant sinonasal tumors was systematically analyzed and designed using the SBSS program, version 22.0.

RESULTS

Table 1: Clinical, demographic outcomes of patients with malignant sinus tumors

Characteristics	Number of patients [90]	Percentage [%]
Age		
20 – 29	18	20.00%
30 – 39	40	44.44%
40 – 49	16	17.78%
50 – 60	14	15.56%
Sex		
Male	54	60.0%
Female	36	40.0%
BMI, kg/m²		
19.5 – 22.9	20	22.22%
23.5 – 26.9	24	26.67%
> 27.0	46	51.11%
Smoking status		
Yes	40	44.44%
No	50	55.56%
Comorbidity		
Hypertension		
Yes	63	70.0%
No	27	30.0%

Diabetes		
Yes	23	25.56%
No	67	74.44%
Coronary heart disease		
Yes	9	10.0%
No	81	90.0%
Thyroid disease		
Yes	14	15.56%
No	76	84.44%
Obesity		
Yes	57	63.33%
No	33	36.67%
Symptoms		
Nasal congestion	22	24.44%
Facial pain	4	4.44%
Headaches	16	17.78%
Swelling	20	22.22%
Vision problems	15	16.67%
Difficulty breathing through the nose	13	14.44%
ASA classification, %		
1	17	18.89%
2	36	40.0%
3	30	33.33%
4	7	7.78%
Education status		
Primary	15	16.67%
Secondary	10	11.11%
University/college	65	72.22%
Marital status		
Single	7	7.78%
Married	73	81.11%
Divorced	7	7.78%
Employment status		
Employed	68	75.56%
Un-employed	22	24.44%
Income status, \$		
< 800	54	60.0%
> 800	36	40.0%

Table 2: Distribution stages and site of malignant sinus tumors on patients

Characteristics	Number of patients [90]	Percentage [%]
Stages, %		
I	24	26.67%
II	18	20.0%
III	9	10.0%
IV	39	43.33%
Site		
Nasal cavity	45	50.0%
Maxillary sinus	27	30.0%
Etmoid sinus	8	8.89%
Olfactory nerve	10	11.11%

Table 3: Intraoperative and postoperative outcomes of patients with malignant sinus tumors

Clinical parameters	Number of patients [90]	Percentage [%]
Endoscopic resection, N [%]	72	80%
Open resection, N [%]	18	20%
Operating time, min, (mean \pm SD)	180.25 \pm 34.68	
Intraoperative bleeding volume, ml, (mean \pm SD)	306.07 \pm 70.58	
Bleeding rate, N (%)	5	5.56%
Length of stay in hospital, min, (mean \pm SD)	250.62 \pm 16.05	
Recovery time, Days	12.68 \pm 4.70	
Admission to the intensive care unit, N [%]	4 [4.44%]	
Follow-up time, months, (mean \pm SD)	2.40 \pm 0.68	

Table 4: Assessment of postoperative pain scores of patients with malignant sinus tumors by VAS

Post-operative time [days]	Endoscopic resection, 72	Open resection, 18	P – value
Day 1	6.8 \pm 0.8	7.2 \pm 0.04	0.044
Day 2	5.21 \pm 0.47	5.98 \pm 0.64	0.0458
Day 3	4.45 \pm 0.54	4.97 \pm 0.65	0.0473
Day 4	3.81 \pm 0.20	4.26 \pm 0.08	0.0468
Day 5	3.14 \pm 0.32	3.95 \pm 0.5	0.0351
Day 6	2.65 \pm 0.18	3.05 \pm 0.07	0.038
Day 7	1.08 \pm 0.044	2.57 \pm 0.16	0.0308

Table 5: Postoperative complications

Complications	Endoscopic resection, 72	Open resection, 18
Bleeding	2 [2.78%]	3 [16.67%]
Infection	2 [2.78%]	2 [2.78%]
Narrowing of the airway	0 [0%]	1 [1.39%]
Cerebrospinal Fluid	0 [0%]	0
Scarring	0 [0%]	1 [1.39%]
Nerve damage	0 [0%]	0 [0%]
Total	4 [5.56%]	7 [38.89%]

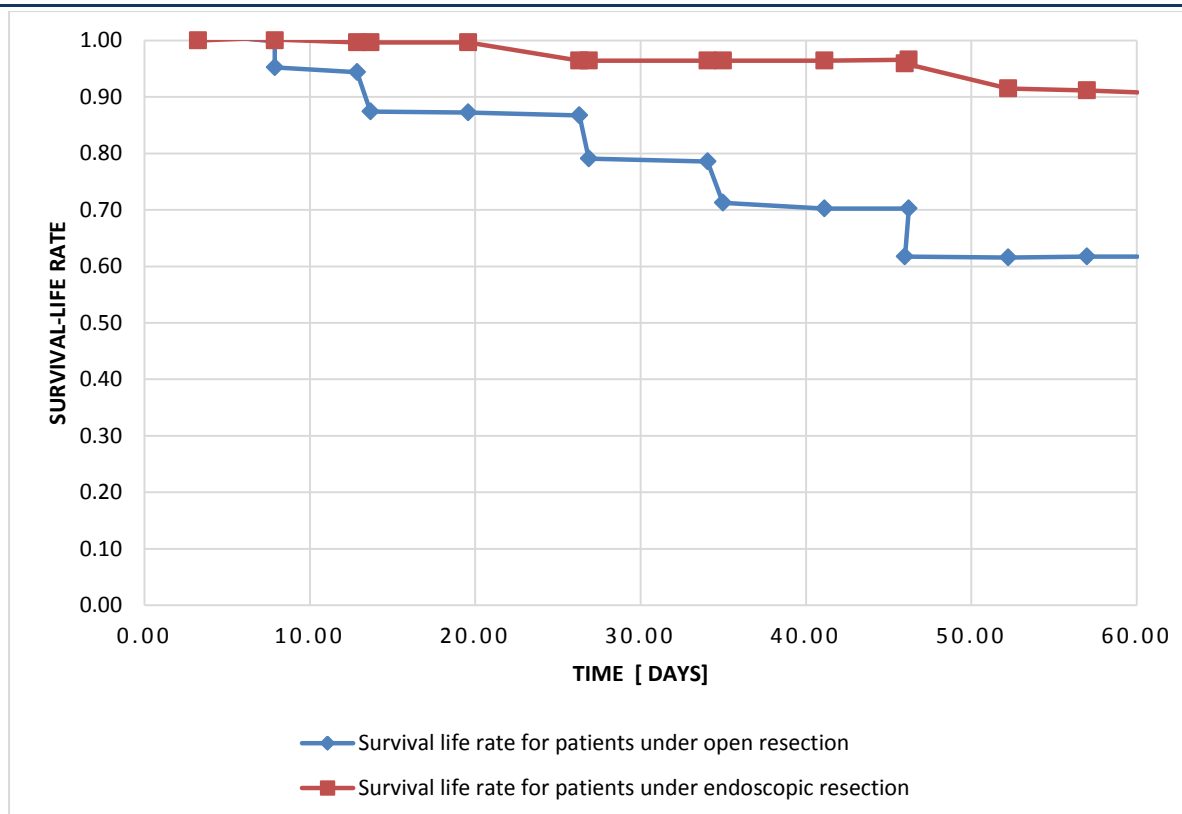


Figure 1: Post-operative survival – life of patients with malignant sinus tumors.

Table 6: Multivariate analysis of risk factors affected on patients with malignant sinus tumors

OR (95% CI)			
Variables	Endoscopic resection, 72	Open resection, 18	P – value
Age, group	2.3 [1.4 – 2.7]	2.1 [0.8 – 2.6]	0.481
< 40			
> 40			
Comorbidity	1.46 [0.423 – 4.815]	1.386 [0.302 – 6.041]	0.582
Hypertension			
Diabetes			
Symptoms	1.5 [0.32 – 5.06]	2.8 [1.14 – 6.77]	0.605
Nasal congestion			
Swelling			
Difficulty breathing			
Stages	1.706 [0.361 – 8.206]	2.8 [0.3 – 5.3]	0.468
I			
II			
III			
IV			
Site	1.360 [0.207 – 8.650]	1.401 [0.351 – 7.045]	0.650
Nasal cavity			
Maxillary sinus			
Etmoid sinus			
Olfactory nerve			
Complications	2.794 [1.343 – 6.550]	2.489 [1.246 – 7.662]	0.492
Infection			
Bleeding			

DISCUSSION

Our results showed that patients in the age group (30-39) years were most affected, at a rate of 44.44%, followed by (20-29), which was 20.0%. The rate of male patients was higher by 60% compared to females by 40%. The BMI > 27.0 was the highest among patients at 51.11%, then the BMI between 23.5 - 26.9 was 26.67%, followed by the BMI between 19.5 - 22.9. It was 22.22%, that of smoking patients was 44.44%, and that of non-smoking patients was 55.56%. The most common comorbidities were high blood pressure, comprising a rate of 70.0%, diabetes was 25.56%, obesity was 63.33%, and the most common symptom in patients were nasal congestion, comprising 24.44. %, swelling included 22.22%, headache included 17.78%, ASA rates were ASA II, which was the highest classification among all patients at a rate of 40.0%, employed persons were 75.56% and non-employed persons were 24.44%, most of the patients were from the married category at a rate of 81.11%.

Regarding the results of the stages and locations of malignant sinus tumors, the most common stages of malignant sinus tumors were the fourth stage, with a rate of 43.33%, and the first stage had a rate of 26.67%, as the most affected sites included the nasal cavity with a rate of 50.0% and the Maxillary sinus with a rate of 30.0%.

Regarding the clinical and surgical outcomes of patients, our results showed that the rate of patients who underwent laparoscopic resection was 80%, while the rate of patients who underwent open resection was 20%. The duration of the surgical procedure was (180.25 ± 34.68) minutes. The volume of bleeding during the operation, ml, was 306.07 ± 70.58, the percentage of patients who experienced bleeding was 5, the duration of stay in the hospital was (250.62 ± 16.05) minutes, the duration of recovery was (12.68 ± 4.70) days, admission to the intensive care unit was 4 cases, and the duration of follow-up (months) was 2.40 ± 0.68. The complication rate for patients who underwent laparoscopic resection surgery was 4 cases, and the complication rate for patients who underwent open resection surgery was 7 cases. The survival rate for patients who underwent laparoscopic resection surgery was 92%, while the survival rate for patients who underwent open resection surgery was 60%.

A study conducted in the United States was found that laparoscopic resection operation can result in a decreased incidence of pain in comparison to open

resection surgery where endoscopic techniques had fewer incisions and fewer tissue dissections and, leading to decreased postoperative discomfort [de Almeida, C. C. *et al.*, 2018]. Also, an additional study corroborated which endoscopic resection surgery exhibited a lower prevalence of complications in comparison with open resection surgery for malignant sinus tumours. Laparoscopic operations had a limited invasiveness, which lowered of the likelihood of problems in terms of infection, bleeding, and harm to nearby structures [Wunsch, H. *et al.*, 2016]. Furthermore, a German study indicated that laparoscopic resection surgery got frequently been in correlation with enhanced quality of life in comparison to open resection surgery. Endoscopic operations can lead to reduced hospitalization duration, minimized scarring, and accelerated recuperation [Kahan, B. C. *et al.*, 2017]. Moreover, studies have consistently shown that laparoscopic resection surgery often results in a more rapid recuperation period in comparison to open resection surgery. [Perisanidis, C. *et al.*, 2012]

CONCLUSION

This study indicated the superiority of the surgical procedure using laparoscopic resection compared to open resection in terms of laparoscopic resection surgery, which is associated with the advantages of less pain, less bleeding, a faster recovery rate, and a low complication rate, as well as the quality of the surgical interventions where laparoscopic resection contributes significantly to reducing the risk of complications such as infection and bleeding, which contribute positively to improving the quality of life for patients and returning to daily activities faster and better.

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