

Salvage endoscopic nasopharyngectomy combined with internal carotid artery pretreatment for rNPC adjacent to the internal carotid artery

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“Survivorship through Quality & Innovation”



Zhi-Qiang Wang, Yu-Long Xie, You-Ping Liu, Xiong Zou, Jin-Hua Chen, Yi-Jun Hua.....Pei-Yu Huang, Ming-Yuan Chen*
Department of Nasopharyngeal carcinoma, Sun Yat-sen University Cancer Center, Guangzhou, China

ABSTRACT

Objective. Salvage endoscopic nasopharyngectomy (ENPG) is a reasonable choice for resectable recurrent nasopharyngeal carcinoma (rNPC). However, in past decades, complete removal of the tumor was not feasible when the recurrent lesion was adjacent to the internal carotid artery (ICA). The present article introduces innovative strategies to ensure sufficient surgical margins while avoiding accidental injury to the ICA. **Study Design.** Retrospective study. **Methods.** We retrospectively reviewed rT2-3 rNPC patients with tumor lesions adjacent to the ICA (≤5 mm) who underwent ENPG at the Sun Yat-sen University Cancer Center between January 2015 and June 2020. Thirty-seven patients were selected for this study. Seventeen patients underwent ENPG using direct dissection, 10 patients underwent endoscopic-assisted transcervical protection of the parapharyngeal ICA combined with ENPG, and 10 patients underwent ICA embolization followed by ENPG. **Results.** With a median follow-up duration of 31 months (range, 5 to 53 months), the 2-year overall survival, progression-free survival, locoregional recurrence-free survival, and distant metastasis-free survival rates of salvage ENPG for rNPC adjacent to the ICA were 88.7%, 72.0%, 72.0%, and 97.3%, respectively. The incidences of grade 1-2 and grade 3-5 postoperative complications were 16.2% and 13.5%, respectively. Two patients experienced ICA rupture during direct dissection but were out of danger after vascular embolization therapy. One patient had a positive margin. Two patients had severe nasopharyngeal wound infections with mucosal flap necrosis. **Conclusion.** ENPG combined with ICA pretreatment allows the feasible and effective resection of rNPC lesions adjacent to the ICA.

RESULTS

1. Clinical characteristics of the patients

Parameter	All patients (n = 37)		
	No	%	
Sex			Thirty-seven patients were selected for this study. Seventeen patients underwent direct dissection, 10 patients underwent endoscopic-assisted transcervical protection of the parapharyngeal ICA combined with ENPG, and 10 patients underwent ICA embolization followed by ENPG. Eight patients experienced cervical lymph node recurrence. Six of the 8 patients had ipsilateral retropharyngeal lymph node recurrence, and 2/8 patients had left neck level II lymph node recurrence. The average distances from the tumor to the ICA were 4.0 mm (range, 3.1-4.8 mm), 2.1 mm (range, 1.0-2.8 mm) and 0.5 mm (range, 0-0.8 mm) in patients who underwent direct dissection, endoscopic-assisted transcervical protection of the parapharyngeal ICA combined with ENPG and ICA embolization followed by ENPG, respectively.
Female	11	29.7%	
Male	26	70.3%	
Pathological grade			
WHO I	2	5.4%	
WHO II	0	0	
WHO III	35	94.6%	
Age, median (range)	48 (25-71)		
rTNM classification			
rT2	21	56.8%	
rT3	16	43.2%	
N0	29	78.4%	
N1	8	21.6%	
N2	0	0	
N3	0	0	
Type of surgery			
ENPG direct dissection	17	46.0%	
Endoscopic-assisted transcervical protection of the parapharyngeal ICA combined with ENPG	10	27.0%	
ICA embolization followed by ENPG	10	27.0%	
Lymph node dissection			
No lymph node dissection	29	78.3%	
Selective lymph node dissection	8	21.7%	
Radiation before surgery			
1 course	33	89.2%	
2 courses	4	10.8%	
Initial radiotherapy dose to primary tumor (Gy), median (range)	70.0, 67.5-72.0		
Initial radiotherapy technique			
2D-RT	7	18.9%	
3D-CRT	2	5.4%	
IMRT	28	75.7%	
Initial treatment			
RT alone	9	24.3%	
Neo+RT	5	13.5%	
CCRT	9	24.3%	
Neo+CCRT	13	35.1%	
Neo+CCRT+Adj	1	2.7%	

3. Nasopharyngeal MR and endoscopic images before and after endoscopic nasopharyngectomy

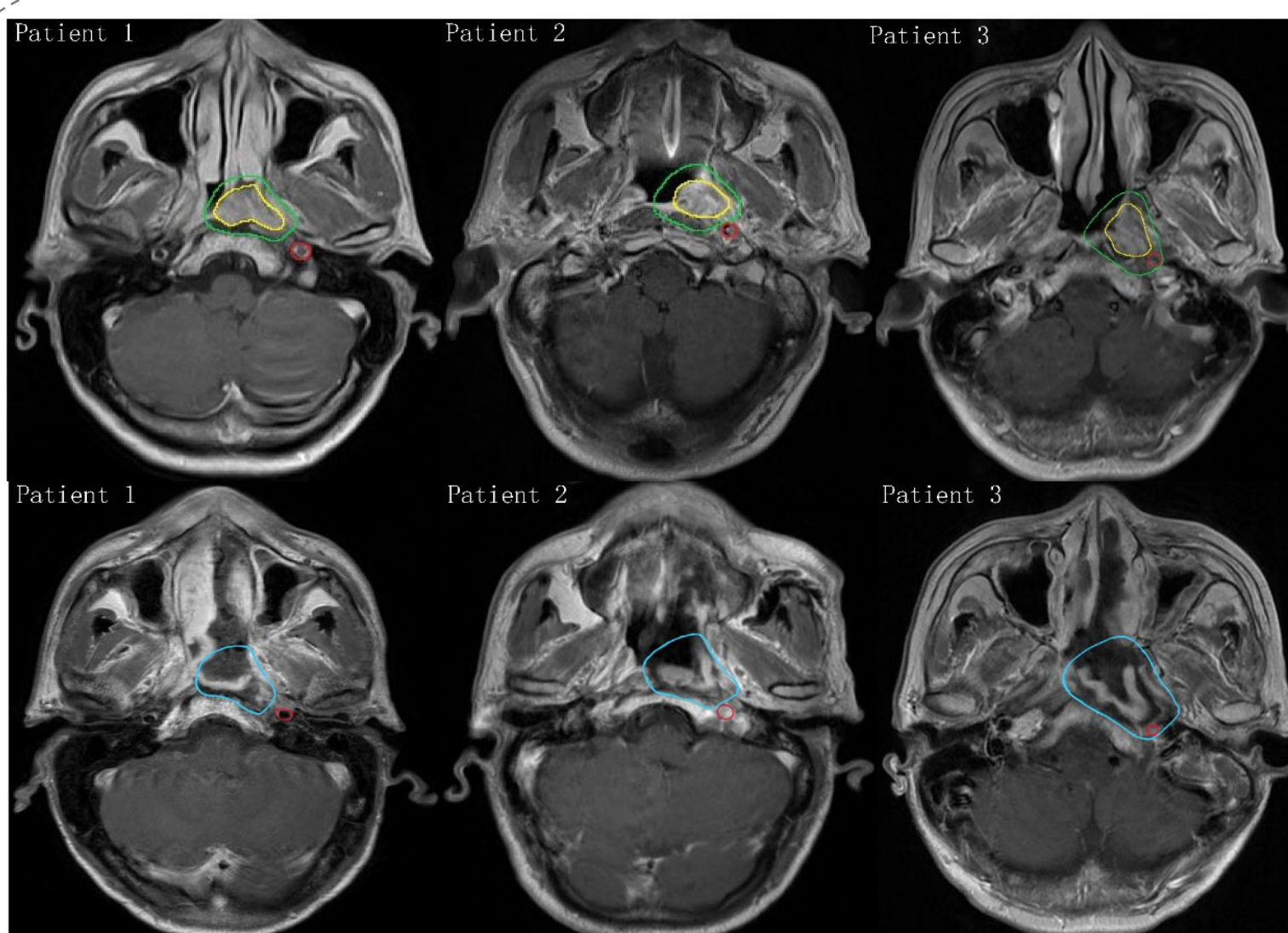


Figure 1. Nasopharyngeal magnetic resonance imaging before and after endoscopic nasopharyngectomy

Patient 1 underwent direct dissection. The distance from the lesion to the internal carotid artery was 4.7 mm. Patient 2 underwent endoscopic-assisted transcervical protection of the parapharyngeal ICA combined with endoscopic nasopharyngectomy. The distance from the lesion to the internal carotid artery was 2.5 mm. Patient 3 underwent internal carotid artery embolization followed by endoscopic nasopharyngectomy. There was no distinct normal interstitial space between the lesion and internal carotid artery. The image of patient 3B shows the left internal carotid artery after resection. Yellow circle: tumor lesion. Green circle: resection range. Red circle: internal carotid artery. Blue circle: actual resection range.

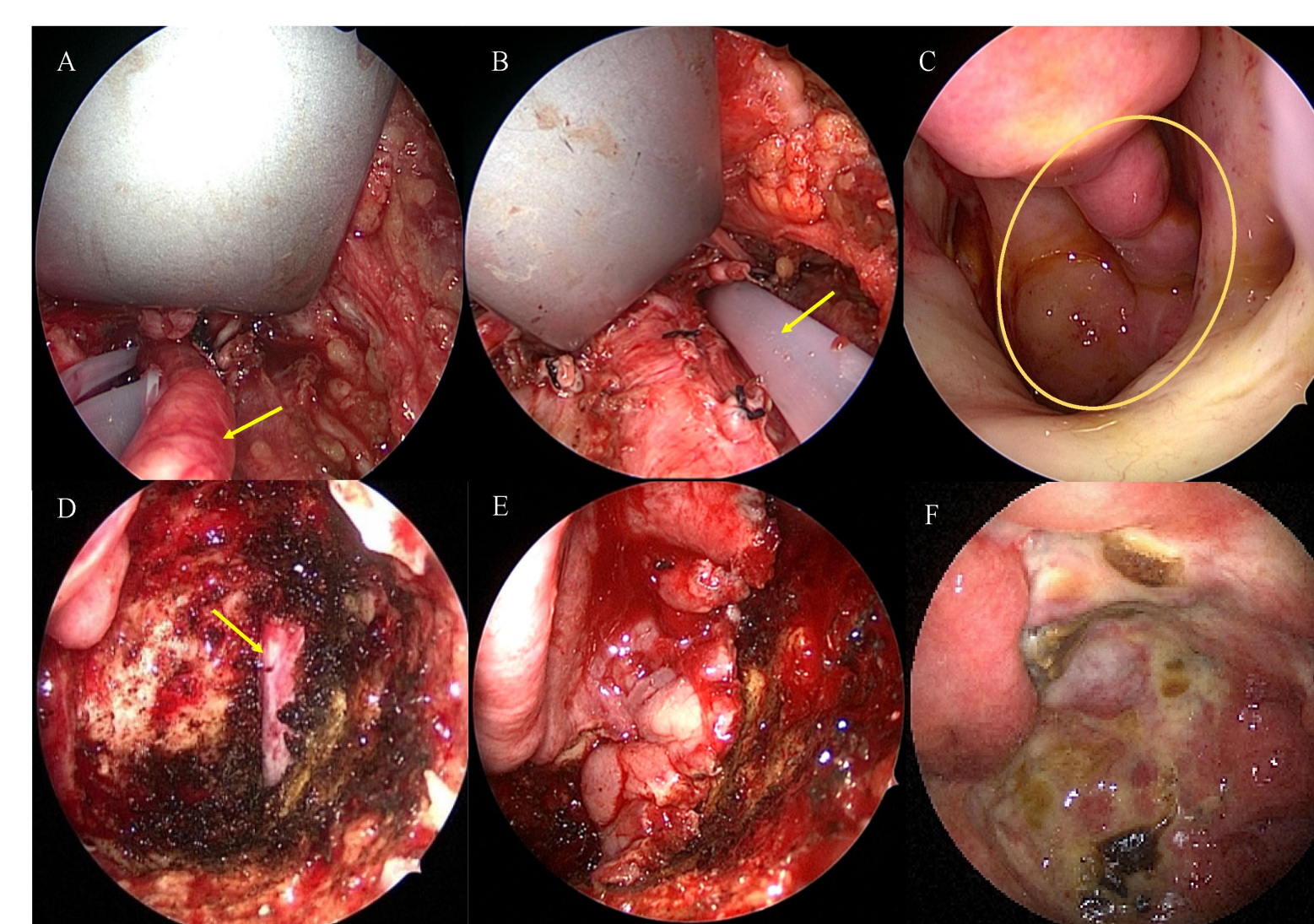


Figure 2. Endoscopic images during surgery.

A shows that the internal carotid artery (yellow arrow) has been exposed during the establishment of an artificial channel. B shows that the internal carotid artery (yellow arrow) was protected by a rubber hose after the establishment of an artificial channel. C shows that the tumor was located in the left posterior wall of the nasopharynx (yellow loop). D shows the endoscopic nasopharynx image after resection. The resection boundary includes the whole roof, posterior wall and part of the right wall, and the entire left wall of the nasopharynx. The bulge and wing base have been removed, and the internal carotid artery (yellow arrow) was exposed. E shows that the nasopharyngeal defect was filled with the pedicle nasal flap, and no abnormal neoplasm was observed. F shows that the nasopharyngeal defect healed 3 months after surgery.

4. The resectable extent of nasopharynx

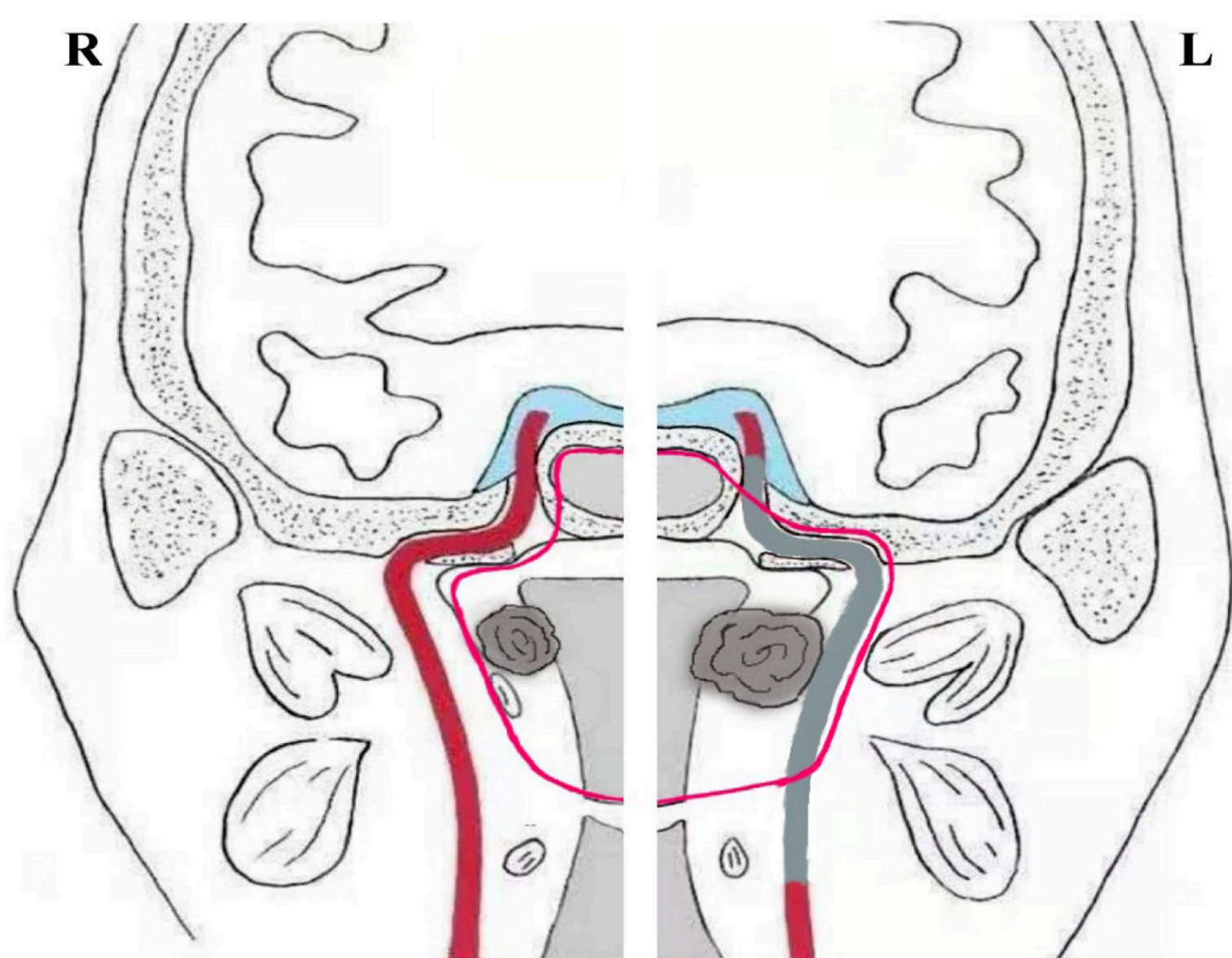


Figure 3. A sketch of the resectable extent of nasopharynx before/after internal carotid artery embolization.

Black shaded area: tumor lesion. Light blue area: the cavernous sinus. Thick red line: normal internal carotid artery embolization. Thick gray line: embolized internal carotid artery. Right pink line: resectable range of the nasopharynx without internal carotid artery embolization. Left pink line: resectable range of the nasopharynx with internal carotid artery embolization.

2. Patient survival outcomes

The last follow-up date was November 10, 2020. The follow-up time ranged from 5 to 53 months (median, 31 months) after surgery. One of the 37 patients had a positive margin and underwent salvage radiotherapy after surgery. Eleven of the 37 patients developed locoregional recurrence or distant metastasis. Overall, the 2-year OS, PFS, LRRFS and DMFS rates of salvage ENPG for rNPC adjacent to the ICA were 88.7%, 72.0%, 72.0% and 97.3%, respectively. (Figure 1)

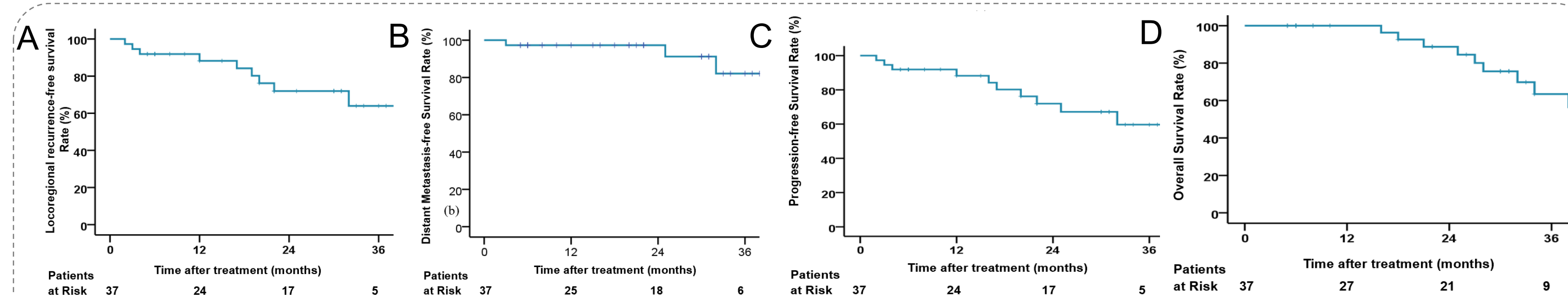


Figure 4. Kaplan-Meier curves of locoregional recurrence-free survival (A), distant metastasis-free survival (B), progression-free survival (C) and overall survival (D) for patients with rNPC lesions adjacent to the ICA.

5. Surgery-related complications

At the time of the last follow-up, eight patients had surgery-related complications (Common Terminology Criteria for Adverse Events 4.0 criteria), and the incidences of grade 1-2 and grade 3-5 postoperative complications were 16.2% and 13.5%, respectively. Among the patients who underwent direct dissection, only one developed serious flap necrosis, headache and otitis media postoperatively. Among the patients who underwent endoscopic-assisted transcervical protection of the parapharyngeal ICA combined with ENPG, the incidence of grade 3-5 complications was 40%, and these included nasal regurgitation, dysphagia, mouth skew, pharyngeal leakage, limited shoulder range of motion and flap necrosis. Two patients had severe nasopharyngeal wound infections with mucosal flap necrosis, and one patient needed a permanent feeding tube after surgery. The complication with the highest incidence was dysphagia (40%). Relative to the patients' preoperative condition, no serious surgery-related complications were observed via ICA embolization following ENPG. In addition, no patient experienced delayed stroke after ICA embolization.

CONCLUSIONS

Salvage ENPG combined with ICA pretreatment enables the feasible and effective resection of rNPC lesions adjacent to the ICA.

Correspondence

Corresponding author: Ming-Yuan Chen, MD, Department of Nasopharyngeal Carcinoma, Sun Yat-sen University Cancer Center, 651 Dongfeng East Road, Guangzhou, Guangdong, 510060, P. R. China. Email: chmingy@mail.sysu.edu.cn