Primary surgical treatment of nasal vestibule cancer – therapeutic outcome and reconstructive strategies*

K. Zaoui, P.K. Plinkert, P.A. Federspil

Department of Otorhinolaryngology, Head and Neck Surgery, University Hospital Heidelberg, Ruprecht-Karls-University Heidelberg, Germany

Rhinology 56: 4, 393-399, 2018
https://doi.org/10.4193/Rhin17.157

***Received for publication:**
July 18, 2017
Accepted: October 17, 2017

Objective: The treatment strategy of squamous cell carcinoma of the nasal vestibule (SCCNV) is controversial. The objective of this study is to investigate the role of surgery, which is the preferred treatment option at our institution.

Design: This was a monocentric prospective study of patients that were diagnosed with SCCNV between 2005 and 2013.
Material and Methods: Twenty-six patients were included. Tumors were staged using the UICC (7th edition) TNM classification of nasal cavity cancer and the classification proposed by Wang. The primary treatment was surgery in all patients. Survival data were statistically analyzed using the Kaplan-Meier method. The median follow-up time was 6 years.

Results: Using the UICC classification, 9/26 tumors were staged as pT1 (35%), 7/26 as pT2 (27%), and 10/26 as pT4a (39%). Using the classification by Wang, 9/26 tumors were staged as pT1 (35%), 15/26 as pT2 (58%), and 2/26 as pT3 (8%). Reconstruction was performed using an implant-retained prosthesis in 50% of patients and by plastic surgery in the remaining 50%. Only 2/26 patients (8%) needed adjuvant radiation therapy. The five-year recurrence-free survival (RFS) was 86.7%, disease-specific survival was 96.2% and overall survival was 91.8% after five years.

Conclusion: Surgery in SCCNV gives an excellent prognosis and minimized the need for radiotherapy.

Key words: Squamous cell carcinoma, nasal cavity neoplasm, nasal vestibulum neoplasm, oncological surgery, rhinectomy

Introduction

The nasal vestibule is the anterior part of the nasal cavity consisting of the inner lining of the lateral crus and alar soft tissue, the medial crus of the lower lateral cartilage, the nasal floor, and the dome. The medial part of the nasal vestibule includes the columella, the medial alar cartilage, and the medial membranous nasal septum. The nasal vestibule is lined with squamous epithelium and contains hair follicles and sebaceous glands. Squamous epithelium becomes nasal ciliated epithelium behind the limen nasi. This transition zone (muco-cutaneous junction) is covered by transitional epithelial cells[1, 2].

Squamous cell carcinomas of the nasal vestibule (SCCNV) represent less than 1% of malignant tumors in the head and neck area[3-5]. Most SSCNV patients initially report small ulcerations and unspecific symptoms, such as nose bleeds and nasal obstruction before contour changes are observed in the nose. Therefore, SCCNVs are usually diagnosed several months after onset of the first symptoms. The prognosis is slightly better for SCCNVs than tumors of the paranasal sinus[6-10]. Despite the controversial discussion of an elective neck dissection for SCCNV, the lymph node status still remains an important prognostic factor for tumors in the sinonasal area[11, 12]. Especially for advanced stage SSCNV (T3,T4), neck dissection was suggested for nasal cavitiy and maxillary sinus carcinoma[13]. Smoking and human papillomavirus infection are regarded as risk factors for SCCNV[14]. However, the exact causes have not been clarified to date.

There is no universally accepted specific classification system for SSCNV. Some authors have used the Union for International Cancer Control (UICC) TNM classification system for nonmelanoma skin cancer, which is similar to the American Joint Committee on Cancer classification. However, the nasal vestibule is part of the nasal cavity, therefore a staging system for nasal cavity tumors should be used. Even relatively small SCCNVs may invade

the nasal skin and are then classified as T4a tumors by the UICC nasal cavity TNM system. Many authors have reported that the classification system proposed by Wang predicts the prognosis more accurately[2, 9, 15-17]. In the Wang system, skin infiltration classifies still as T2 (Figure 2A-C).

Therapy includes surgery with reconstruction (autologous material or bone-anchored nasal prosthesis), primary radio-(chemo) therapy, brachytherapy, or combined treatment modalities[18-20]. Different primary therapies in predominately early stage patient populations have been investigated in a few recent studies[14, 18, 21-24]. However, no study has investigated primary surgical treatment in a patient population with locally advanced SCCNV.

In this single center study, we investigated the treatment, outcome, factors predicting recurrence, and different staging systems in SCCNV patients diagnosed between 2005 - 2013 and compared our data with the published literature.

Materials and methods

Ethical approval and informed consent

Ethical permission was obtained from the local ethics committee according to the Declaration of Helsinki on biomedical research involving human subjects.

Surgery

Patients who underwent primary surgical treatment for a newly diagnosed SCCNV at the Department of Otolaryngology, Head and Neck Surgery at the University Hospital Heidelberg between 2005 and 2013 were included in this study. Only SCC patients with tumors originating in the nasal vestibule were included. Treatment modalities were discussed by a multidisciplinary tumor board. According to the NCCN guidelines (National Comprehensive Cancer Network) surgical resection was the preferred treatment option. Surgery was performed with an external approach, including lateral rhinotomy, partial rhinectomy, and total rhinectomy by one surgeon (PAF). In addition to the presurgical clinical examination, a determined ultrasound examination by an experienced physician followed by a CT scan of the mid-face with thin-layer images as well as a CT of the neck/thorax and an ultrasound of the abdomen was used for staging and tumor extension purposes and determination of possible local or distant metastasis. Depending on the results of pre-surgery CT scans or the tumor stage, selective neck dissection was performed to remove suspect cervical lymph nodes or occult neck metastases. None of these patients had previously received radiotherapy, chemotherapy, or any surgical tumor intervention in the head and neck region. For all patients, clinical and follow-up data (sex, age, TNM classification, histopathological differentiation, treatment modalities, and outcome) were available. Tumor size was obtained from the clinical intraoperative measurements and the pathology report. Tumors were staged according to the UICC (7th edition) and Wang classification.

Table 1. Clinicopathological and surgical characteristics of the study population.

Characteristic	Number (%) (n = 26)
Age [years] (range)	58.8 (38-80)
Gender	
- Male	17 (65.4%)
- Female	9 (34.6%)
Smoking history	
- Yes	16 (61.4%)
- No	10 (38.5%)
T (UICC)	
- T1	9 (34.6%)
- T2	7 (26.9%)
- T3	0 (0.0%)
- T4a	10 (38.5%)
- T4b	0 (0.0%)
T (Wang)	
- T1	9 (34.6%)
- T2	15 (57.7%)
- T3	2 (7.7%)
N (Lymph node)	
- N0	25 (96.2%)
- N1	1 (3.8%)
M (Distant metastasis)	
- M0	25 (96.2%)
- M1	1 (3.8%)
G (Grading)	
- G1	1 (3.8%)
- G2	21 (80.8%)
- G3	4 (15.4%)
Initial reconstructive strategy	
- Surgical reconstruction	13 (50.0%)
- Prosthesis	13 (50.0%)

Statistics

Overall survival (OS), disease-specific survival (DSS), and recurrence-free survival (RFS) for local, regional, and distant failure were statistically analyzed using IBM SPSS Statistics software (version 22). The Kaplan-Meier method was used to estimate survival. Differences between groups were tested by log rank tests. In all statistical tests, a p-value of 0.05 or below was considered as statistically significant. Differences between subgroups were tested using Chi square tests.

The median follow-up time was 6 years (range 1–12 years) with regular clinical examinations. Beside periodic endoscopic follow-ups, ultrasound examination of the neck was routinely performed. In addition, patients having been reconstructed did receive a yearly CT scan of the mid-face and every patient a CT of the thorax once a year.

Results

Twenty-six patients with a primary diagnosis of SCCNV and planned primary surgical treatment were identified and included in the analysis. Baseline patient characteristics are presented in

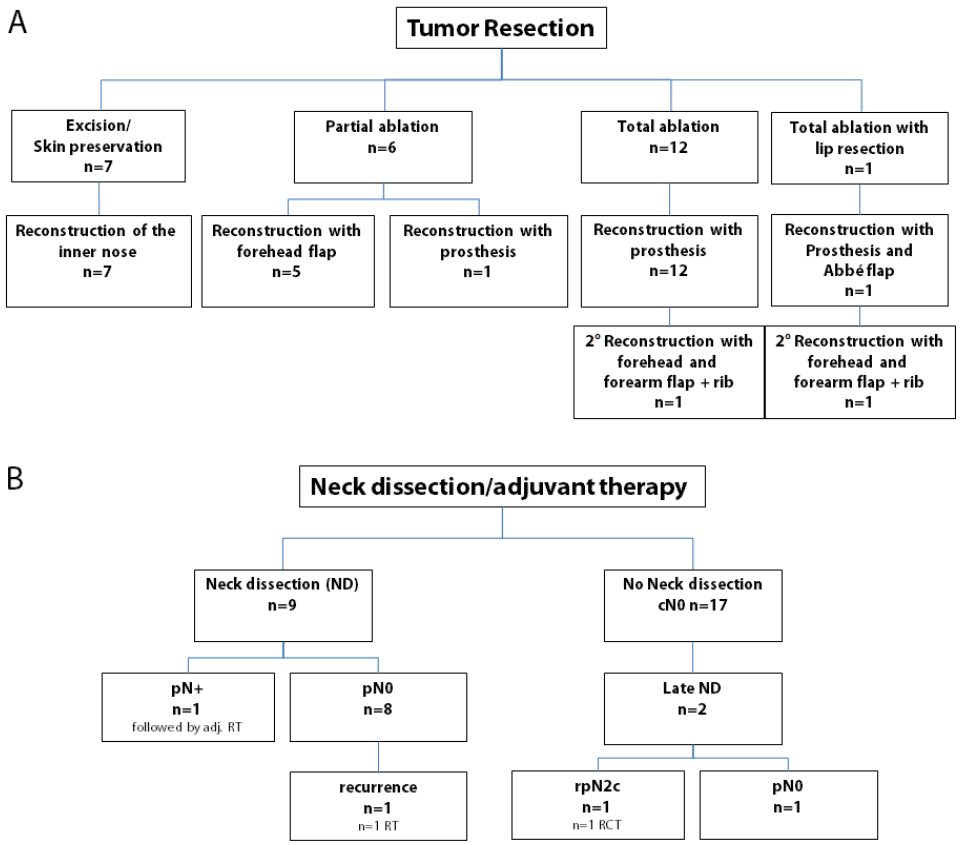

Figure 1. A) Tumor resection procedures and reconstruction techniques; n= number of patients. B) Neck dissection procedures and adjuvant therapy (RT = radiotherapy; RCT = chemoradiation; n= number of patients).

Table 1. Patient age ranged from 38 to 80 years, and the mean age was 58.8 years. The gender ratio was 17/9 (male/female). 16/26 patients were smokers (62%). 21/26 SCCNVs (81%) were moderately differentiated (G2). 1/26 carcinoma (4%) was well differentiated (G1) and 4/26 (15%) were poorly differentiated (G3). According to the UICC classification, 9/26 SCCNV tumors were staged as pT1 (35%), 7/26 as pT2 (27%), none as pT3 (0%), and 10/26 as pT4a (39%). According to the Wang classification, 9/26 tumors were staged as pT1 (35%), 15/26 as pT2 (58%), and 2/26 as pT3 (8%).

All patients received primary surgical treatment. The surgical procedure depended on the tumor size and extension. Seven tumors were removed with a lateral rhinotomy approach, six with a partial rhinectomy, and 13 with a total rhinectomy. Fourteen patients with an extensive resection (subtotal or total ablation) were fitted with an implant-retained nasal prosthesis. In five patients with a partial nose resection, the nose was reconstructed with a forehead flap. One patient with a partial nose resection was fitted with a partial prosthesis. In seven patients, an inner lining and framework defect was reconstructed using anterior based septal mucoperichondrious flaps and cartilage grafts (Figure 1A). Two patients primarily fitted with a prosthesis respectively a prosthesis and a Abbé flap later underwent total reconstruction with a microvascular radial forearm free flap, forehead flap, and costal cartilage graft caused of initially unsatisfied reconstruction (Figure 2 A–H).

Local outcome

All surgical approaches achieved a histopathological R0 resection with free surgical margins.

Outcome in the neck

In addition to local resection, nine concomitant neck dissections (one unilateral and eight bilateral) were performed in patients with suspected lymph node status based on ultrasound and CT scan results (cN+, 35%). Neck dissections were not performed in 17 patients because the imaging results were inconspicuous. Only one patient out of 26 (4%) had neck metastases (pN1). One patient had a pulmonary distant metastasis at the time of initial diagnosis (detected by CT scan of the thorax and ultrasound of the abdomen). The tumor board consented to local curative resection followed by excision of the solitary pulmonary metastasis.

One patient with an initial pN0 status developed a late metastatic disease (pN1). The patient underwent a revision neck

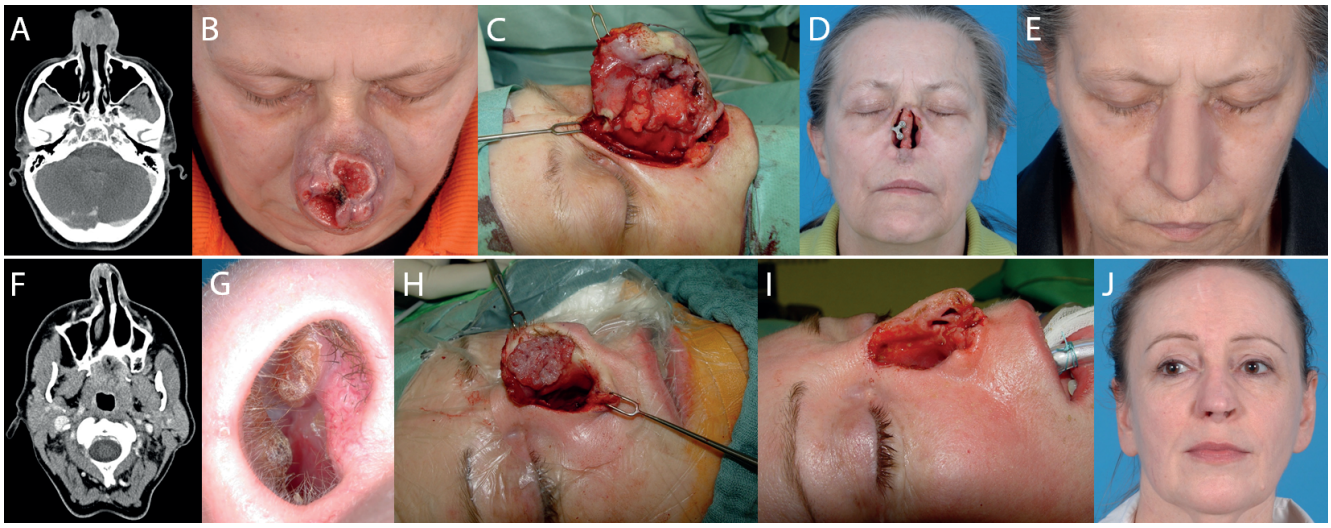

Figure 2. (A-E) – Reconstruction by an implant-retained nasal prosthesis: (A) axial CT scan shows tumor infiltration of the skin and the cartilage of the nasal septum, (B) skin infiltrating SCCNV classified as T4a according to the 7th UICC and T2 in classification of Wang , (C) total rhinectomy, (D) implant position (nasal plate of the Epiplating® System by Medicon eG Tuttlingen, Germany), (E) patient with fitted prosthesis (anaplastologist Jörn Brom, Heidelberg, Germany); (F-J) – surgical reconstruction by a paramedian forehead-flap with an anterior based septal mucoperichondrious flap and cartilage graft: (F) axial CT scan shows tumor growth in the nasal vestibule, (G-H) SCCNV UICC T2/ Wang T2, (I) partial rhinectomy, (J) patient 8 month after reconstruction.

dissection.
During follow-up, two cN0 patients developed suspect cervical lymph nodes. One was treated with a unilateral neck dissection (pN0) and the second with a bilateral neck dissection (pN2c).

Adjuvant treatment

2/26 individuals (8%) received adjuvant radiation therapy to treat a local extension (infiltration of the upper lip and premaxillary bone) and extracapsular spread of a lymph node metastasis. Patient comorbidities (cardiovascular and pulmonary problems) only allowed a single agent concomitant systemic therapy (Figure 1B).

Long term outcome and relapse

One local relapse (4%) occurred in a patient with a UICC pT2/ Wang pT2 tumor. Recurrence was detected in the nasal dome 51 months after primary surgery without metastasis.
2/26 patients (8%) had regional recurrences. In Patient 1, a cervical pN2b metastasis was observed 4 months after primary local resection and neck dissection. This patient underwent two local surgical resections of the left facial soft tissue 7 and 8 months after primary treatment. After surgery, the patient received adjuvant combined radio-/chemotherapy because of remaining non-resectable disease and an early cervical metastatic relapse, as shown by a PET-CT of the peri- and retromandibular region. Patient 2 was initially diagnosed with a UICC pT4a/Wang 3 SCCNV and developed a pN1 lymph node metastasis 46 months after primary resection and 50 months after bilateral neck dissection. Both metastases were resected surgically followed by concomitant chemoradiotherapy (Figure 1B).
The one-year RFS was 96.2% (one local recurrence), the four-year RFS was 92.1%, and the five-year RFS was 86.7%. Recurrence was caused by delayed lymph node metastases (Figure 3).
No statistically significant difference in RFS was found between patients treated with surgical reconstruction and patients fitted with a nasal prosthesis (log rank p=0.419) (Figure 3).
We exploratively compared the outcome of small versus advanced local respectively metastatic disease classified by the UICC and Wang methods. Regarding local recurrences or rather delayed regional lymph node metastases no significant difference was observed between early stage SCCNV (pT1-2) and advanced tumor stages (pT3-4) classified by the UICC method (p=0.931). Kaplan-Meier analysis revealed that the RFS was not significantly different between early stage (T1) and advanced stage (T2-3) SCCNVs classified by the Wang method (p=0.165).
Three deaths were recorded. One death was SCCNV-related and two were associated with a second malignancy (non-Hodgkin lymphoma and non-small cell lung cancer). DSS was 96.2% after one and five years and OS was 96.2% one year after treatment and 91.8% five years after treatment (Figure 3).

Discussion

In this study, we analyzed 26 patients who underwent surgery as a primary treatment for SCCNV. Referral bias was avoided because the patients in our cohort were primarily treated with surgery rather than intensity-modulated radiotherapy, which

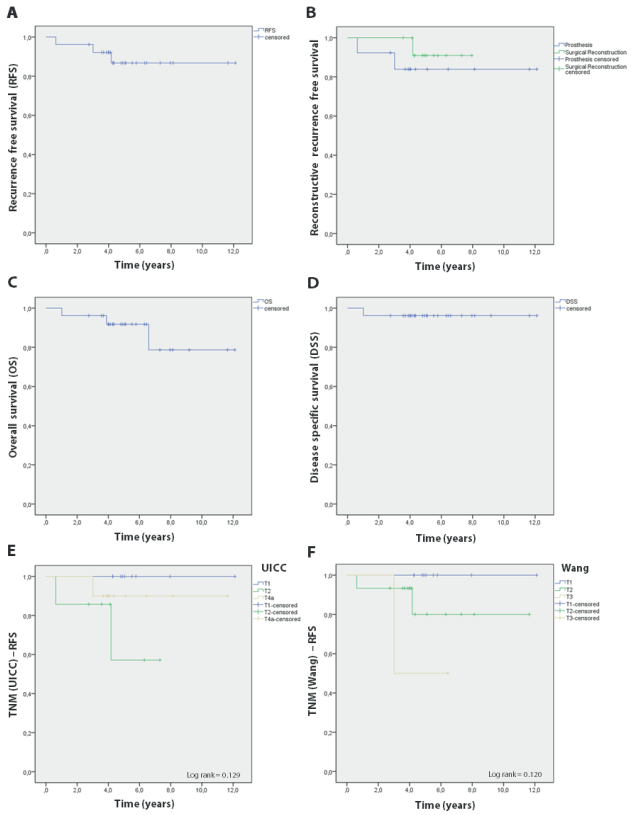

Figure 3. Kaplan-Maier plots showing (A) recurrence-free survival (RFS), (B) RFS dependent on reconstructive method, (C) overall survival (OS), and (D) disease-specific survival (DSS). Kaplan-Maier plots showing RFS dependent on tumor classification by 7thed UICC (E) and Wang (F) methods.

is often chosen as primary therapy for SCCNV. Compared to previously published studies with mostly early staged tumors, a high percentage (39%) of patients (10/26) in our cohort were diagnosed with advanced T classified tumors (UICC T3-4). The main focus of this study was to compare primarily curative surgical management of early stage (T1-2 UICC) and advanced stage (T3-4 UICC) SCCNV tumors. We will now compare our findings with those of previously published studies, particularly with non-surgical primary therapeutic approaches.

Local control

The therapy of choice for early stage SCCNV remains controversial. Some argue that treating T1-2 staged SCCNV tumors primarily with radiotherapy or brachytherapy achieves better cosmetic results and five-year local control rates of 68%–95%(3, 17, 25, 26), but only a 5-year local control rate of 53% (n=7) at patients treated with external beam radiotherapy (EBRT) only [27]. However, Koopmann et al. showed a five-year local recurrence-free survival rate of 92.6% after primary surgical treatment of early stage (T1-2) tumor patients[28]. In this study, we report similar high local control rates (93.8%) following primary surgical treatment of T1-2 SCCNV tumors. Previous studies have demonstrated similar local control rates following primary treatment of advanced stage SCCNV patients (T3-4) with radiotherapy (71%) (26), surgery, or surgery with adjuvant radiotherapy (73%)[22, 27]. In the present study, we observed no local recurrence following primary surgical treatment of advanced stage SCCNVs. These findings suggest that primary surgical intervention of early and advanced SCCNVs is not inferior to primary radiotherapy in terms of local control.

Regional control

Regional control in the neck was reported in 87% of early stage T1-2 (UICC/Wang) SCCNV patients following primary radiotherapy and in 100% of patients following primary brachytherapy[17, 20, 29]. Treatment of advanced stage SCCNV tumors with radiation alone achieved a regional metastatic control of 84.6%[30]. Primary surgical treatment achieved a regional (neck) control of 96.7% in T1-2 SCCNV patients[28] and 81.8% in advanced stage patients (T3-4). In agreement with previous findings, primary surgical intervention attained a regional control of 15/16 T1-2 patients (94%) and 9/10 in T3-4 patients (90%) in the present study. These findings suggest that satisfactory regional control can be achieved by primary surgical therapy.

Survival

Previous studies have revealed variable five-year RFS (including local and distant failure) rates (52%–77%) following primary treatment of early and advanced stage SCCNV patients with primary surgery, primary radiation therapy, or combined therapy[2, 6, 10, 22, 23, 25, 27, 31-33]. We observed a higher five-year RFS of 86.7% following primary surgical treatment.

Agger et al. reported a five-year DSS rate of 74% in SCCNV patients treated with multiple modalities[2]. Similarly, Wray et al. reported a DSS rate of 91% following primary radiotherapy or a combination of surgery and radiotherapy[20]. In the present study, we found a five-year DSS rate of 96.2% after primary surgical treatment.

Five-year OS rates of 58%–75% have been reported following primary radiotherapy or a combination of radiotherapy and surgery. OS rates were higher (92.3%) in SCCNV patients after primary surgical treatment or primary surgery followed by radiotherapy[28]. In the present study, the five-year OS rate was 91.8% after primary surgical treatment alone.

We compared our findings with those of Agger et al.[2] and concluded that the two different tumor staging systems (UICC and Wang classification) do not consistently predict survival. This idea was supported by Koopmann et al.[28]. However, study cohorts for SCCNV are small. Therefore, multicenter studies for SCCNV are needed regarding a predictive value in comparing survival rates for SCCNV patients classified by the UICC and Wang.

In summary, the local and regional control rates of early stage SCCNV tumors in this study were similar to previous studies. However, local and regional control of advanced stage SCCNV tumors was better in our patient cohort than previously published cohorts treated with primary surgery, primary radio-/chemotherapy, or combined treatment. Regardless of tumor size, RFS, DSS, and OS were higher in our cohort of primarily surgical-treated SCCNV patients compared with published cohorts.

Conclusion

SCCNV is a relatively rare and often early staged tumor, but can cause considerable loco-regional damage. In addition, the cosmetic outcome can be unsatisfactory after primary surgery with or without radiotherapy and primary radiotherapy/brachytherapy, often resulting in facial deformities. Regardless of tumor stage, we have observed a high local and regional control rate with a long RFS, DSS, and OS in SCCNV patients treated primarily with surgery. We conclude from our study that primary open surgery is a valuable treatment option for all stages. We propose tumor stage-adapted primary open surgery as the treatment of choice for all SCCNVs followed by early rehabilitation with reconstruction or an implant-retained nasal prosthesis. Adjuvant radiotherapy should be reserved for advanced stage cancer.

Acknowledgement

No financial support or funding. This work has been presented in parts at the AHNS 9th International Conference on Head and Neck Cancer, July 2016, Seattle, USA.

Authorship contribution

All authors made substantial contributions to the study.
KZ: designed and coordinated the study, participated in data acquisition and analysis, interpreted the data and drafted the manuscript. PKP: participated in data analysis, critically revised the manuscript for important intellectual content. PAF: designed and coordinated the study, participated in data acquisition and analysis, interpreted the data, critically revised the manuscript for important intellectual content.

Conflict of interest

All authors declare that they have no conflict of interest.

References

1. Jeannon JP, Riddle PJ, Irish J, O'Sullivan B, Brown DH, Gullane P. Prognostic indicators in carcinoma of the nasal vestibule. Clin Otolaryngol. 2007;32(1):19-23.
2. Agger A, von Buchwald C, Madsen AR, Yde J, Lesnikova I, Christensen CB, et al. Squamous cell carcinoma of the nasal vestibule 1993-2002: a nationwide retrospective study from DAHANCA. Head & neck. 2009;31(12):1593-9.
3. Kummer E, Rasch CR, Keus RB, Tan IB, Balm AJ. T stage as prognostic factor in irradiated localized squamous cell carcinoma of the nasal vestibule. Head & neck. 2002;24(3):268-73.
4. Patel P, Tiwari R, Karim AB, Nauta JJ, Snow GB. Squamous cell carcinoma of the nasal vestibule. J Laryngol Otol. 1992;106(4):332-6.
5. Mazeron JJ, Chassagne D, Crook J, Bachelot F, Brochet F, Brune D, et al. Radiation therapy of carcinomas of the skin of nose and nasal vestibule: a report of 1676 cases by the Groupe Europeen de Curietherapie. Radiother Oncol. 1988;13(3):165-73.
6. Mendenhall NP, Parsons JT, Cassisi NJ, Million RR. Carcinoma of the nasal vestibule. Int J Radiat Oncol Biol Phys. 1984;10(5):627-37.
7. Goepfert H, Guillamondegui OM, Jesse RH, Lindberg RD. Squamous cell carcinoma of nasal vestibule. Arch Otolaryngol. 1974;100(1):8-10.
8. Haynes WD, Jones JV, Cumming JC. HL-A antigens on circulating platelets. Ultrastructural demonstration. Transplantation. 1974;18(1):81-6.
9. Wang CC. Treatment of carcinoma of the nasal vestibule by irradiation. Cancer. 1976;38(1):100-6.
10. Wong CS, Cummings BJ, Elhakim T, Briant TD. External irradiation for squamous cell carcinoma of the nasal vestibule. Int J Radiat Oncol Biol Phys. 1986;12(11):1943-6.
11. Khademi B, Moradi A, Hoseini S, Mohammadianpanah M. Malignant neoplasms of the sinonasal tract: report of 71 patients and literature review and analysis. Oral Maxillofac Surg. 2009;13(4):191-9.
12. Fornelli RA, Fedok FG, Wilson EP, Rodman SM. Squamous cell carcinoma of the anterior nasal cavity: a dual institution review. Otolaryngol Head Neck Surg. 2000;123(3):207-10.
13. Carrillo JF, Guemes A, Ramirez-Ortega MC, Onate-Ocana LF. Prognostic factors in maxillary sinus and nasal cavity carcinoma. Eur J Surg Oncol. 2005;31(10):1206-12.
14. Buchwald C, Franzmann MB, Jacobsen GK, Juhl BR, Lindeberg H. Carcinomas occurring in papillomas of the nasal septum associated with human papilloma virus (HPV). Rhinology. 1997;35(2):74-8.
15. Wittekind C, Compton CC, Greene FL, Sobin LH. TNM residual tumor classification revisited. Cancer. 2002;94(9):2511-6.
16. Greene FL, Sobin LH. The TNM system: our language for cancer care. J Surg Oncol. 2002;80(3):119-20.
17. Levendag PC, Nijdam WM, van Moolenburgh SE, Tan L, Noever I, van Rooy P, et al. Interstitial radiation therapy for early-stage nasal vestibule cancer: a continuing quest for optimal tumor control and cosmesis. Int J Radiat Oncol Biol Phys. 2006;66(1):160-9.
18. Bussu F, Tagliaferri L, Mattiucci G, Parrilla C, Dinapoli N, Micciche F, et al. Comparison of interstitial brachytherapy and surgery as primary treatments for nasal vestibule carcinomas. Laryngoscope. 2016;126(2):367-71.
19. Federspil PA. Ear epistheses as an alternative to autogenous reconstruction. Facial Plastic Surg: FPS. 2009;25(3):190-203.
20. Wray J, Morris CG, Kirwan JM, Amdur RJ, Werning JW, Dziegielewski PT, et al. Radiation therapy for nasal vestibule squamous cell carcinoma: a 40-year experience. Eur Arch Otorhinolaryngol. 2016;273(3):661-9.
21. Weiss D, Koopmann M, Stenner M, Savvas E, Rudack C. Clinicopathological characteristics of carcinoma from unknown primary in cervical lymph nodes. Eur Arch Otorhinolaryngol. 2015;272(2):431-7.
22. Vital D, Morand G, Huber GF, Studer G, Holzmann D. Outcome in squamous cell carcinoma of the nasal vestibule: a single center experience. Head & neck. 2015;37(1):46-51.
23. Dowley A, Hoskison E, Allibone R, Jones NS. Squamous cell carcinoma of the nasal vestibule: a 20-year case series and literature review. J Laryngol Otol. 2008;122(10):1019-23.
24. Ledderose GJ, Reu S, Englhard AS, Krause E. Endonasal resection of early stage squamous cell carcinoma of the nasal vestibule. Eur Arch Otorhinolaryngol. 2014;271(5):1051-5.

25. Horsmans JD, Godballe C, Jorgensen KE, Bastholt L, Lontoft E. Squamous cell carcinoma of the nasal vestibule. Rhinology. 1999;37(3):117-21.
26. Wallace A, Morris CG, Kirwan J, Amdur RJ, Werning JW, Mendenhall WM. Radiotherapy for squamous cell carcinoma of the nasal vestibule. Am J Clin Oncol. 2007;30(6):612-6.
27. Vanneste BG, Lopez-Yurda M, Tan IB, Balm AJ, Borst GR, Rasch CR. Irradiation of localized squamous cell carcinoma of the nasal vestibule. Head & neck. 2016;38 Suppl 1:E1870-5.
28. Koopmann M, Weiss D, Savvas E, Rudack C, Stenner M. Clinicopathological and immunohistochemical characteristics of surgically treated primary carcinoma of the nasal vestibule - an evaluation of 30 cases. Clin Otolaryngol. 2015;40(3):240-7.
29. Langendijk JA, Poorter R, Leemans CR, de Bree R, Doornaert P, Slotman BJ. Radiotherapy of squamous cell carcinoma of the nasal vestibule. Int J Radiat Oncol Biol Phys. 2004;59(5):1319-25.
30. McCollough WM, Mendenhall NP, Parsons JT, Mendenhall WM, Stringer SP, Cassisi NJ, et al. Radiotherapy alone for squamous cell carcinoma of the nasal vestibule: management of the primary site and regional lymphatics. Int J Radiat Oncol Biol Phys. 1993;26(1):73-9.
31. Weinberger JM, Briant TD, Cummings BJ, Wong CS. The role of surgery in the treatment of squamous cell carcinoma of the nasal vestibule. J Otolaryngol. 1988;17(7):372-5.
32. Pantelakos ST, McGuirt WF, Nussear DW. Squamous cell carcinoma of the nasal vestibule and anterior nasal passages. Am J Otolaryngol. 1994;15(1):33-6.
33. Mendenhall WM, Stringer SP, Cassisi NJ, Mendenhall NP. Squamous cell carcinoma of the nasal vestibule. Head & neck. 1999;21(5):385-93.

Philippe A. Federspil, MD
Director of the Division of Oncological ORL Surgery
Department of Otorhinolaryngology
Head and Neck Surgery
Ruprecht-Karls-University
Im Neuenheimer Feld 400
D-69120 Heidelberg
Germany

Tel: +49-6221-566705
Fax: +49-6221-5633637
E-mail:
federspil@med.uni-heidelberg.de