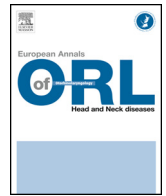




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Original article

Transoral-transcervical oropharyngectomy without mandibulotomy, associated to fasciocutaneous radial forearm free-flap reconstruction, for oropharyngeal cancer: Postoperative course, oncologic and functional results, and prognostic factors

M. Roux^a, O. Dassonville^a, M. Ettaiche^b, G. Poissonnet^a, A. Sudaka^c, A. Bozec^{a,*}

^a Institut universitaire de la face et du cou, 31, avenue de Valombrose, 06103 Nice, France

^b Département de biostatistiques, centre Antoine-Lacassagne, 33, avenue de Valombrose, 06189 Nice, France

^c Département d'anatomie pathologique, centre Antoine-Lacassagne, 33, avenue de Valombrose, 06189 Nice, France

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ABSTRACT

Objective: To analyze postoperative course, oncologic and functional results and prognostic factors of transoral-transcervical oropharyngeal cancer surgery without mandibulotomy, associated to radial forearm free-flap reconstruction.

Material and methods: Retrospective analysis of computerized medical records of all patients who underwent this type of surgery in our institution between 2004 and 2014. Predictive factors of oncologic and functional results were investigated on univariate and multivariate analyses.

Results: Forty-four patients (37 male, 7 female; mean age, 62.3 ± 9.3 years) were included. Three-year overall, disease-specific and recurrence-free survival was 90%, 92% and 79%, respectively. Functional scores were satisfactory (normal or slight impairment) for feeding, speech and oral opening functions in 86%, 93% and 100% of cases, respectively. ASA score \geq III had significantly negative impact on overall survival ($P=0.005$) and on feeding ($P=0.01$) and speech ($P=0.01$).

Conclusion: Transoral-transcervical oropharyngeal cancer surgery without mandibulotomy provided excellent oncologic and functional outcomes; it is an advantageous alternative to the conventional conservative transmandibular oropharyngectomy.

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1. Introduction

Treatment of locally advanced oropharyngeal cancer has been improved by progress in radiation therapy (conformational radiation therapy and intensity modulation) and concomitant association to chemotherapy or targeted therapy drugs (cetuximab) [1,2]. Surgery, however, still has a major role to play, whether in the primary phase of treatment or as salvage after failure of non-operative management [2,3]. Transmandibular oropharyngectomy used to be the gold standard resection for locally advanced oropharyngeal cancer, but morbidity, especially associated with mandibulotomy, stimulated the development of less invasive approaches [4,5]. Numerous advances in technique have improved functional and esthetic results, including the use of free-flaps [6] and CO₂ laser and robot-assisted transoral surgery [5,7]. Certain

tumors, however, are difficult to resect via this approach, due to inferior and/or tongue-base extension. A transcervical approach here enables control of the inferior part of resection without resorting to mandibulotomy [8,9].

The objectives of the present study were to analyze postoperative course, oncologic and functional results and prognostic factors in transoral-transcervical surgery with fasciocutaneous radial forearm free-flap reconstruction in oropharyngeal cancer.

2. Material and methods

2.1. Population

A retrospective study included all oropharyngeal cancer patients undergoing transoral-transcervical surgery, without mandibulotomy, with fasciocutaneous radial forearm free-flap reconstruction, in our institution between July 1, 2004 and January 31, 2014. Patients operated on for oropharyngeal cancer via other approaches (exclusive transoral, transmandibular, etc.) or with reconstruction

* Corresponding author. Tel.: +33 6 83 39 78 72; fax: +33 4 92 03 17 64.
E-mail address: alexandre.bozec@nice.unicancer.fr (A. Bozec).

using another type of flap were excluded. All patients had histologically proven oropharyngeal squamous cell carcinoma without previous treatment. Tumors were staged following the 2009 Tumor-Nodes-Metastases (TNM) classification of the Union for International Cancer Control (UICC). Comorbidity was assessed on ASA (American Society of Anesthesiologists) score.

2.2. Operative technique

Procedures were performed by a double surgery team, with radial forearm free-flap harvesting in the same step as head and neck tumor resection. Elective tracheotomy was systematic, with gastrostomy tube fitted at end of surgery.

Surgery began with neck dissection. Resection then used thermofusion forceps to improve margin visualization. Resection began on a transoral approach to the superior end of the tumor and was completed on a transcervical approach to the inferior end. After locating and releasing the greater hypoglossal nerve, the mylohyoid muscle and posterior digastric belly were sectioned, providing satisfactory access to the lower part of the oropharyngeal cavity. Locating and dissecting the internal carotid artery above the posterior digastric belly enabled safe wide resection of the parapharyngeal space and the whole masticator space if necessary.

Conjoint frozen sections were systematically sampled at the resection margins for analysis; if positive, resection was extended around the sampled area and a further series of sections were taken for biopsy.

2.3. Measurements and analyses

Postoperative course was studied by recording all medical and/or surgical complications. (In our institution, pre- and postoperative data for patients receiving free-flap reconstruction are systematically entered in a computerized spreadsheet).

Resection quality was assessed histologically in terms of safe or positive margins in the specimen and after any extended resection and sampling; resection was considered safe if the last sampled sections were tumor-free. Tumor infiltration depth and any perineural tumoral spread, vascular emboli or metastatic cervical adenopathy capsule rupture were also recorded.

Patients were followed up in surveillance consultation every 2 months during the first year, every 3 months during the second, every 4 months during the third, then every 6 months, in line with French Society of Otorhinolaryngology (SFORL) guidelines [10]. Oncologic events (local, regional or remote recurrence) and time to onset were recorded from the patient's computerized files. Overall, disease-specific and recurrence-free survival were assessed on Kaplan–Meier analysis.

Functional results were assessed at the systematic 12-month follow-up. To achieve objectivity, a standardized form based on Hidalgo et al.'s study [11], as previously reported [12], was used, scoring each study domain from 0 to 3 as follows:

- feeding: 3 = normal or nearly normal feeding; 2 = slightly impaired oral feeding, feeding slightly limited, difficulty with certain solid foods, rare episodes of oronasal reflux; 1 = moderately impaired oral feeding, feeding limited, exclusively liquid or semi-liquid, frequent episodes of oronasal reflux; 0 = oral feeding severely impaired or impossible, requiring continued enteral feeding;
- speech: 3 = normal or nearly normal speech; 2 = slightly impaired speech, slightly nasal but without need for repetition; 1 = moderately impaired speech, requiring repetition, but intelligible; 0 = speech severely impaired or impossible, unintelligible;

Table 1

Clinical and histologic data for the 44 patients.

| Characteristics | n = 44 | % |
|--|--------------|----------------|
| <i>Clinical characteristics</i> | | |
| Gender: female/male | 7/37 | 16/84 |
| Age: ≤ 70 years | 33/11 | 75/25 |
| Smoking ^a : yes/no | 34/10 | 77/23 |
| ASA score: \leq III | 38/6 | 86/14 |
| T stage: T2/T3/T4 | 19/16/9 | 43/36/21 |
| N stage: N0/N1/N2a–c/N3 | 18/5/18/3 | 41/11/41/7 |
| Global stage: \leq III | 9/35 | 20/80 |
| Tumor extension ^b : LPW/TB/SP/PPW/POC | 35/31/19/6/8 | 80/70/43/14/18 |
| Neck dissection: no/uni-/bilateral | 2/21/21 | 4/48/48 |
| Postop RT: no/exclusive/concomitant CT | 7/12/25 | 16/27/57 |
| <i>Histologic data</i> | | |
| Infiltration depth: ≤ 10/11–20/> 20 mm | 11/19/14 | 25/43/32 |
| Histologic N stage: N0/N1/N2a–c/N3 | 9/7/25/3 | 20/16/57/7 |
| Specimen margins: positive/safe | 12/32 | 27/73 |
| Final margins ^c : positive/safe | 0/44 | 0/100 |
| Perineural spread: yes/no | 18/26 | 41/59 |
| Vascular emboli: yes/no | 5/39 | 11/89 |
| Capsule rupture: yes/no | 21/23 | 48/52 |

LPW: lateral pharyngeal wall; TB: tongue base; SP: soft palate; PPW: posterior pharyngeal wall; POC: posterior oral cavity; postop RT: postoperative radiation therapy; CT: chemotherapy.

^a Current or former smoking (total consumption > 5 pack-years).

^b Several possible per patient.

^c Final margins on pathology after any final resection and sections.

- oral opening [12]: 3 = normal oral opening; 2 = slightly restricted oral opening, but greater than 2 finger-widths; 1 = moderately restricted oral opening, between 1 and 2 finger-widths; 0 = severely restricted opening, < 1 finger-width.

The impact of clinical factors (age ≤ 70 years; gender; smoking status; ASA score \leq III; T stage ≤ 3; N stage ≤ 1), histologic factors (infiltration depth ≤ 20 mm; histologic N stage ≤ 1; safe or positive specimen margins; perineural spread; vascular emboli; capsule rupture) on overall, disease-specific and recurrence-free survival was studied on univariate (log-rank test) then multivariate analysis (Cox model). The functional impact (score ≤ 2 for feeding, speech and oral opening) of the same factors and of postoperative radiation therapy was studied on univariate (Chi² confirmed by Fisher test) then multivariate analysis (logistic regression). Variables associated with *P*-values < 0.10 on univariate analysis were conserved for multivariate analysis. Statistical analysis used R.2.10.1 software for Windows, with the significance threshold set at 5%.

3. Results

3.1. Patient characteristics

Forty-four patients were included: 37 male, 7 female; mean age, 62.3 ± 9.3 years. TNM staging was: 19 T2 (43%), 16 T3 (36%), 9 T4 (21%); 18 N0 (41%), 5 N1 (11%), 18 N2a–N2c (41%), 3 N3 (7%); 9 global stage I or II (20%), 35 global stage III or IV (80%). Twenty-nine of the 37 patients receiving postoperative radiation therapy received ≥ 60 Gy. Table 1 shows clinical and histologic data.

3.2. Postoperative course

The tracheotomy cannula was removed at a median 11 days (range, 7–30 days). Median hospital stay was 20 days (range, 13–58 days). There were 6 failures of radial forearm free-flap reconstruction, with complete flap necrosis, requiring repeat reconstruction, by 4 radial forearm free-flaps and 2 pectoralis major flaps; secondary reconstruction was successful.

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