Sys Rev Pharm 2021;12(1): 720-725
A multifaceted review journal in the field of pharmacy

Surgical Treatment of Advanced Hypopharyngeal Cancer with Circumferential Pharyngeal Reconstruction Using a Radial Free Flap

[1]Darkhan Akhmedin, [2]Abai Makishev, [3]Aizhan Bekisheva *, [4]Assiya Kukanova, [5]Ilyas Rutzhanuly, [6]Ivan Shtefanov, [7]Marat Mauletbayev

[1]MD, Department of Oncology, Astana Medical University, Manas street 17, Nur-Sultan, Kazakhstan. Darhan_ah@mail.ru
[2]Doctor of medical sciences, Department of Oncology, Astana Medical University, Manas street 17, Nur-Sultan, Kazakhstan. makishev.a@amu.kz
[3]MD, Department of Oncology, Astana Medical University, Manas street 17, Nur-Sultan, Kazakhstan. 19860317@mail.ru
[4]MD, Department of Oncology, Astana Medical University, Manas street 17, Nur-Sultan, Kazakhstan. assiya55@rambler.ru
[5]MD, Department of Oncology, Astana Medical University, Manas street 17, Nur-Sultan, Kazakhstan. ilyas_rutzhanuly@mail.ru
[6]MD, Department of Oncology, Astana Medical University, Manas street 17, Nur-Sultan, Kazakhstan. ivan_tern@mail.ru
[7]MD, Department of Oncology, Astana Medical University, Manas street 17, Nur-Sultan, Kazakhstan. mauletbaev.m@mail.ru

Corresponding Author: Bekisheva Aizhan* **Email**: 19860317@mail.ru

ABSTRACT

Reconstruction of pharyngeal defects after total laryngectomies and extirpation of hypopharyngeal and upper esophageal carcinomas presents a challenging task. Goals of reconstruction include restoration of normal swallowing and adequate voice rehabilitation. The reconstructive armamentarium contains many options for reconstruction and creation of a new upper digestive tract. This article focuses on the most commonly used free tissue transfer options for the reconstruction of these defects.

Keywords: Laryngopharynx cancer, reconstruction of pharyngeal defects

Correspondence:
Aizhan Bekisheva
MD, Department of Oncology, Astana Medical University, Manas street 17, Nur-Sultan, Kazakhstan.
Emil: 19860317@mail.ru

INTRODUCTION

Squamous cell hypopharyngeal cancer in the structure of malignant head and neck tumors is about 3-5% [1, 2]. In 95% of cases, hypopharyngeal cancer has a squamous cell origin arising from the epithelial layer; the strongest etiological risk factors are alcohol use, tobacco use, and mutagenesis associated with human papillomavirus. [3-8] Malignant hypopharyngeal cancer is associated with the highest mortality rate of all head and neck cancers. Low survival rates are explained by the prevalence of late manifestations of the disease and aggressiveness of tumors arising in this localization. Cancer is the second most common cause of death in Kazakhstan [9-11]. According to the latest published data of statistical materials "Indicators of oncological service of the Republic of Kazakhstan", the incidence of hypopharyngeal cancer is 0.9:100000, about 171 new cases are registered annually, and it occupies the 17th rank in the morbidity patterns of malignant neoplasms. Mortality from hypopharyngeal cancer in 2018 in Kazakhstan was 0.6 per 100,000 population and it is increasing annually [12].

Most often, from 70% to 85%, squamous cell hypopharyngeal cancer is diagnosed at stages III–IV of the disease, which is due to long-term asymptomatic and infiltrative tumor growth [13]. An abundant lymph node network leads to frequent metastasis to the cervical lymph nodes, and at the time of diagnosis, 65-80% of cases already have metastases on the affected side, and 40% have occult nodal metastases on the contralateral side [14-15]. In spite of combined and complex therapy, immediate and long-term results of hypopharyngeal cancer treatment have the worst survival rate among all types of head and neck cancer; according to most authors, the 5-year overall survival rate ranges from 13 to 45% [16-20].

It is well known that the traditional approach to the treatment of locally advanced laryngeal cancer today is total laryngopharyngectomy, with partial or circular resection of the larynx, resection of the cervical esophagus and one-stage reconstruction of the pharyngeal defect, followed by adjuvant radiotherapy [21-24]. In addition, surgery remains the preferred option when the disease relapses, and after earlier ineffective chemoradiotherapy [25]. Most patients often have nutritional deficiencies and significant metabolic disorders [26]. Also, patients who previously underwent radiation therapy or chemoradiotherapy have decreased regenerative reserves and, as a result, a higher risk of postoperative complications [27-29].

In this regard, the problem of one-stage reconstruction of the pharyngeal circumference and the cervical esophagus, as well as primary wound healing in the first stage, is a necessary component for the timely continuation of adjuvant therapy and is important as a rehabilitation phase [30]. There is currently no consensus on the best method for reconstruction of the pharynx and cervical esophagus after total laryngopharyngectomy and the issue still remains controversial [31-32]. Currently, free flaps are the preferred reconstruction option. Free visceral or free fasciocutaneous flaps are used to reconstruct circular defects in the larynx and cervical esophagus to create a neopharynx and restore the continuity of the digestive tract [33-38]. They provide a better functional result with fewer complications [39]. The most frequently used reconstructive options with satisfactory results have been free fasciocutaneous flaps [40-41].

In this article, we present clinical case of the use of a free fasciocutaneous flap to close defects after total laryngopharyngectomy with circular resection of the cervical esophagus.

MATERIALS AND METHODS

Clinical observation; Case presentation

Patient K., 27 years old, came to the Nur-Sultan city Multiprofile Medical Center (MMC) in January 2020 with

complaints of difficulty in eating, pain while swallowing, hoarseness and shortness of breath.

The anamnesis shows that the patient considers herself ill since June 2019, when during the 32nd week of pregnancy she noted the appearance of discomfort in the throat. After the end of pregnancy, the patient was treated for pharyngitis for one month, in dynamics due to increasing dysphagia and the appearance of an enlarged lymph node in the neck was examined in the cancer center of the place of residence, where after the diagnosis the patient received 3 courses of chemotherapy according to the scheme: Cisplatin, 5FU. Due to the progression of the process, she applied independently to the Nur-Sultan city Oncology Center.

Patient had no bad habits. HPV testing was not carried out. Repeated fibrogastroduodenoscopy, fibrolaryngoscopy and biopsy were performed again. Histological report: Squamous Cell Carcinoma, G2.

On examination: the laryngeal cartilages are flattened; the larynx is displaced. No crepitations are detected. Indirect laryngoscopy revealed an ulcerative-infiltrative tumor of the left pyriform sinus, with involvement of the posterior wall of the pharynx and larynx. The left side of the larynx is immobile, and the vocal cleft is narrowed to 3 mm in diameter. A conglomerate of lymph nodes with decay up to 6.0 cm in diameter and limited mobility is detected in projections of zone IIA on the left side. Magnetic Resonance Imaging of the neck with "Gadovist®" contrast agent was performed. Axial and frontal planes of the laryngopharynx projections revealed a tumor mass measuring 7.9 × 3.7 × 3.3 cm, infiltrating and invading the left lateral and posterior laryngeal wall, pyriform sinus, and vocal cords on the left side. The laryngeal lumen is narrowed, deformed, and the tumor extends to the anterior longitudinal ligament of the spine. A lymph node conglomerate measuring 8.0 × 5.4 × 5.5 cm under the lower jawbone on the left region (IB-IIA zones), extending beyond the skin (Fig.1)

On the basis of the medical history and examination the following diagnosis was made:

"IVA stage Hypopharyngeal cancer T4aN2cM0, III stage dysphagia. Laryngostenosis.

Second degree Cachexia".

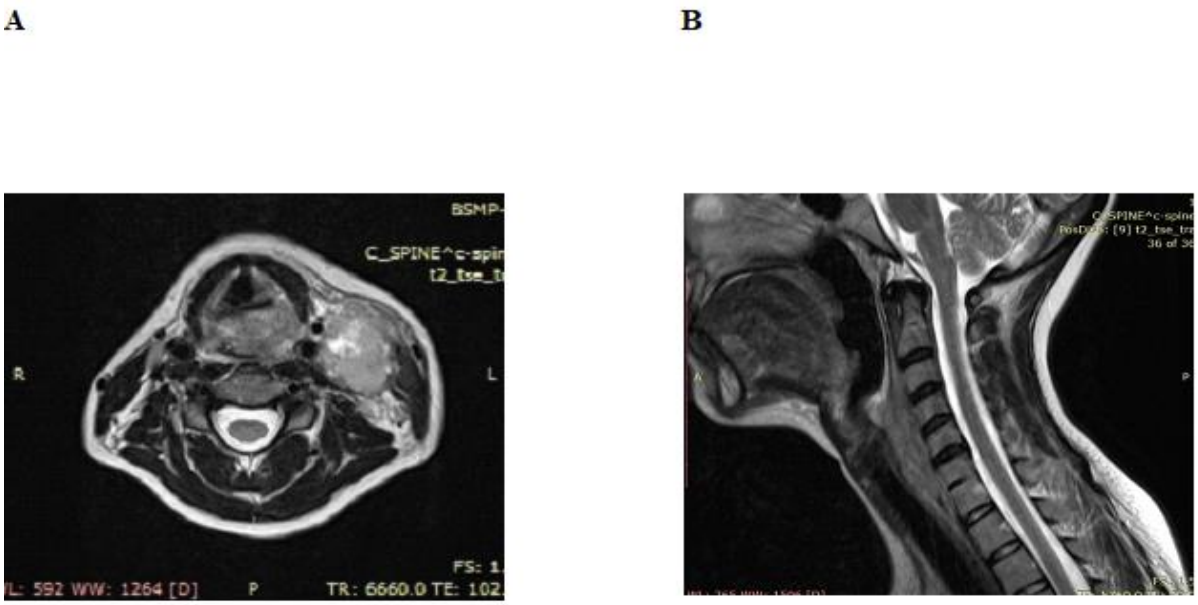

Figure 1: Magnetic resonance imaging of the patient's neck in axial (A) and sagittal (B) projections. Diagnosis: Pharyngeal tumor with spreading to the cervical esophagus.

After discussion, the multidisciplinary team decided on a first-stage surgical intervention followed by adjuvant radiotherapy. Laryngectomy with circular resection of the larynx and cervical esophagus was performed under endotracheal anesthesia through a tracheostomy, hemithyroidectomy on the left, modified radical neck lymph node dissection on the left with resection of the accessory nerve, internal jugular vein, external carotid artery, selective neck lymph node dissection on the right, plastic surgery of the postoperative defect with a free fasciocutaneous radial flap from the left forearm. To form the pharynx, a free fasciocutaneous radial flap 12 × 8 cm in size was excised, with the radial artery and cerebral vein, and microsurgical vascular anastomoses were applied to the recipient facial artery and vein (Fig. 2).

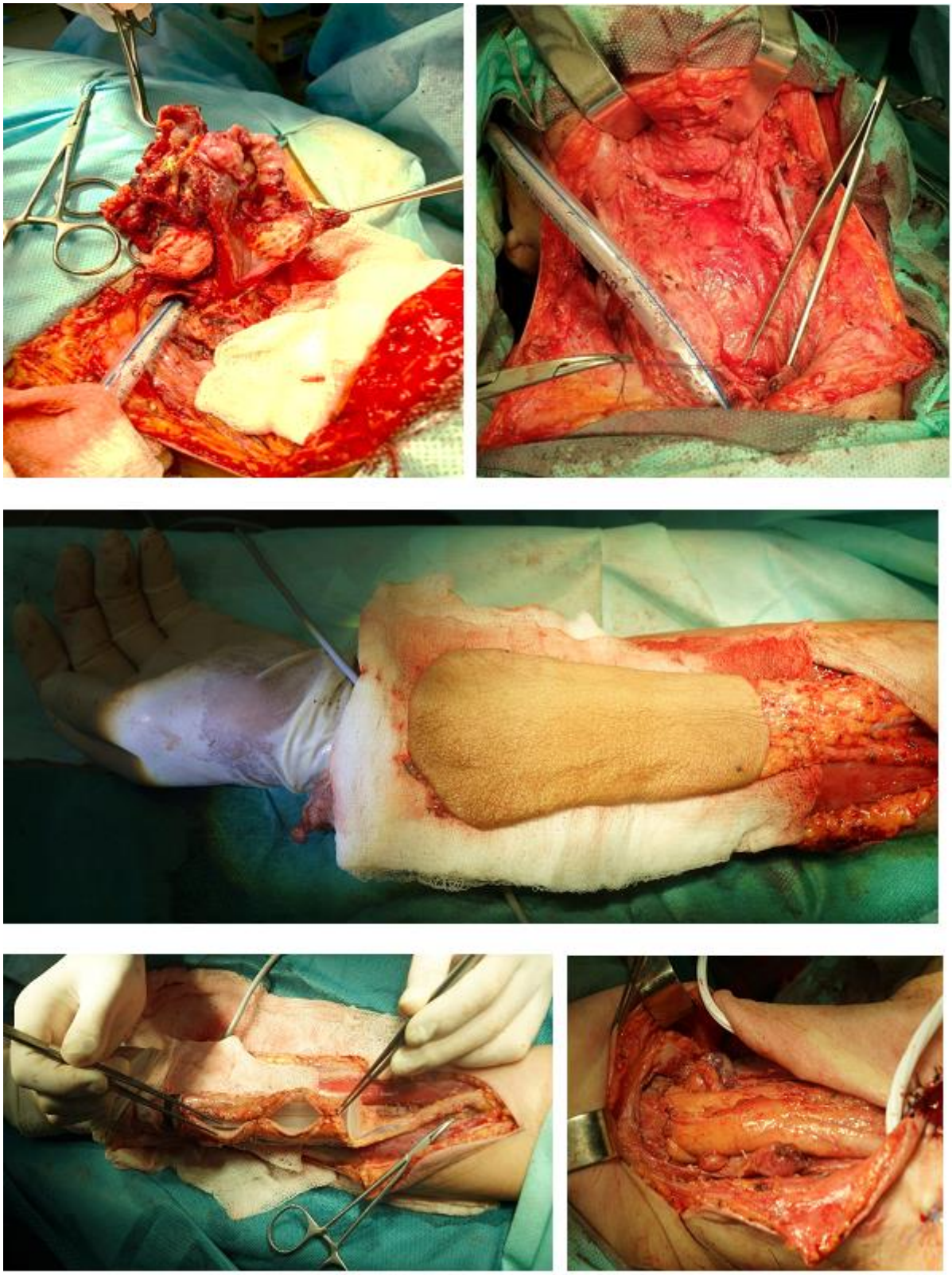

Figure 2: Surgical intervention in patient M.: A - external view of the operating field; B - view of the operating wound after tumor removal, defect formed; C - radial flap formed; D - stages of neopharynx creation; E - neopharynx formed.

Figure 3: Radioscopy with barium sulfate performed on the 10th day after surgery. There are no signs of anastomosis failure.

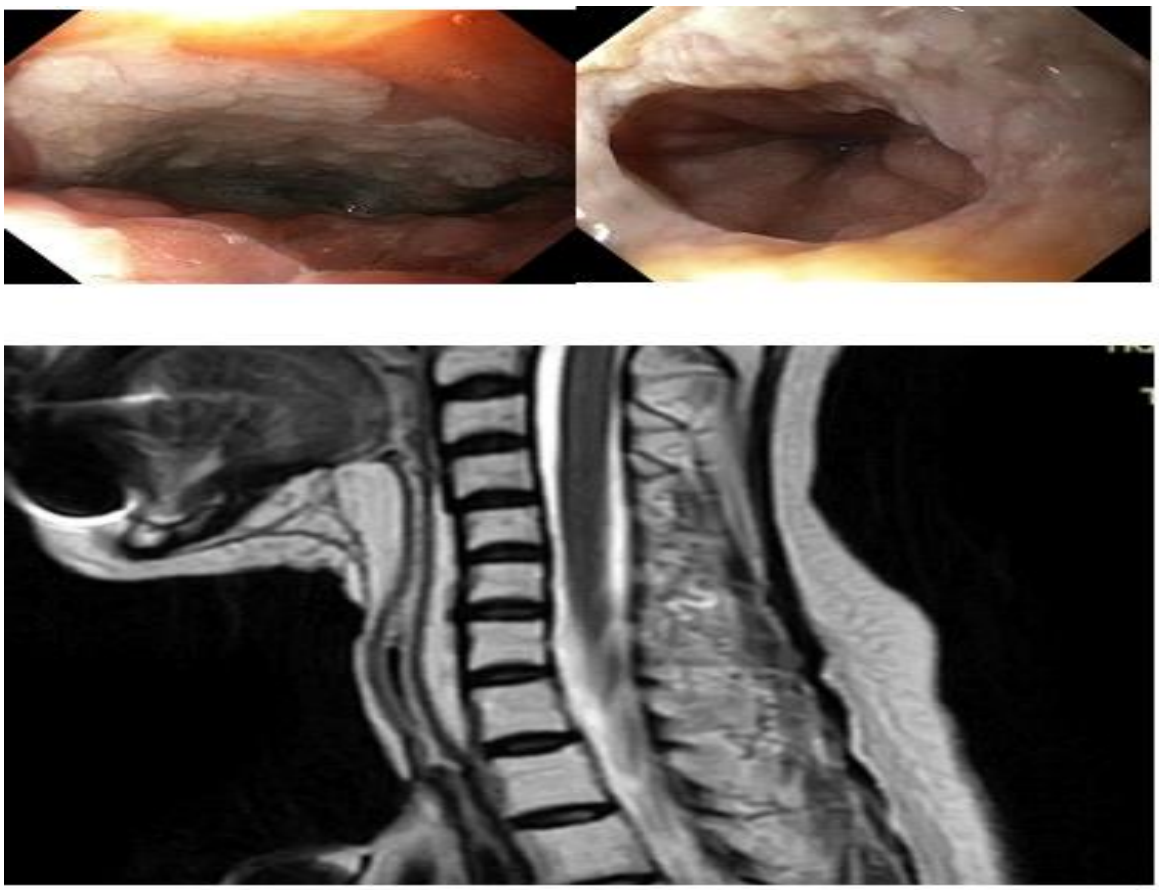

Figure 4: Videolaryngoscopy and MRI picture of a free radial flap 8 months after reconstruction of a circular pharyngeal defect.

The post-operative period was without complications and the patient was discharged 14 days after surgery in a satisfactory condition, followed by continuation of adjuvant radiotherapy.

DISCUSSION

Reconstruction after laryngopharyngectomy for locally advanced squamous cell hypopharyngeal cancer remains a challenge in the practice of head and neck surgery. A free fasciocutaneous radial flap is used in our institution as the preferred option for reconstruction of circular laryngeal defects in locally advanced squamous cell laryngopharynx cancer. The technique itself is relatively simple but reliable and works well in difficult clinical settings. It approaches the ideal goals of reconstruction and includes both a one-stage procedure allowing adequate resection of the tumor, use of tissue outside the field of preoperative irradiation, feasibility for two surgical teams, low donor site morbidity, large vascular caliber and long vascular stalk, as well as no abdominal or thoracic surgery required. The good functional results of swallowing associated with this flap allow patients to achieve a satisfactory quality of life most quickly.

CONCLUSIONS

A single stage combined surgical intervention is the only method aimed at helping this complex category of patients and giving a chance to obtain satisfactory results. Despite the high risk and unfavorable prognosis, well-planned and performed surgical treatment can achieve good results.

REFERENCES

1. Hall SF, Groome PA, Irish J, O'Sullivan B. The natural history of patients with squamous cell carcinoma of the hypopharynx. Laryngoscope 2008; 118:1362–71.
2. Hoffman HT, Karnell LH, Shah JP, Ariyan S, Brown GS, Fee WE, et al. Hypopharyngeal patient care evaluation. Laryngoscope 1997; 107:1005–17.
3. Gupta B, Bray F, Kumar N, Johnson NW. Associations between oral hygiene habits, diet, tobacco and alcohol and risk of oral cancer: a case-control study from India.CancerEpidemiol.2017;51:7–14. https://doi.org/10.1016/j.canep.2017.09.003.
4. Wyss A, Hashibe M, Chuang S-C, et al. Cigarette, cigar, and pipe smoking and the risk of head and neck cancers: pooled analysis in the International Head and Neck cancer Epidemiology Consortium. Am J Epidemiol. 2013;178(5):679–90. https://doi.org/10.1093/aje/kwt029.
5. Divaris K, Olshan AF, Smith J, et al. Oral health and risk for head and neck squamous cell carcinoma: the Carolina Head and Neck Cancer Study. Cancer Causes Control. 2010;21(4):567–75. https://doi.org/10.1007/s10552-009-9486-9.
6. Mazul A, Taylor J, Divaris K, et al. Oral health and HPV-associated head and neck squamous cell carcinoma. Cancer. 2017;123(1):71–80. https://doi.org/10.1002/cncr.30312.
7. Adilbay D, Adilbayev G, Kidirbayeva G, Shipilova V, Sadyk Z, Koyanbekova G, Sokolenko E, Klozar J. HPV infection and P16 expression in oral and oropharyngeal cancer in Kazakhstan. Infect Agent Cancer. 2018 Jan 12; 13:2. doi: 10.1186/s13027-018-0175-8. PMID: 29344081; PMCID: PMC5767046.
8. Adilbayev G, et al. Immediate results HPV-induced cancer of the mouth and oropharynx in Kazakhstan. Ann Oncol. 2016; 27:1.
9. Bekisheva Aizhan, Makishev Abai, Yoshihiro Noso. Impact of Complications after Surgical Treatment of Colon Cancer on Survival SRP. Year: 2020, Volume: 11, Issue: 9: 993-1002. DOI: 10.31838/srp.2020.9.143
10. Surgical Treatment of Renal Cancer with Tumor Thrombus of the Inferior Vena Cava in a Patient after Exploratory Laparotomy M.S. Mauletbayev, A.K. Makishev, S.B. Irimbetov, D.N. Ahmedin, N.M. Dzhantemirova SRP. Year: 2020, Volume: 11, Issue: 4: 451-455. DOI: 10.31838/srp.2020.4.68
11. Shtefanov II, Zhakipova AA, Mukhtarova KE, Peradze MN, Makishev AK. Clinical case of complications of inguinal node metastatic lesion in gastric cancer after surgical treatment. Electron J Gen Med. 2019;16(6): em174. https://doi.org/10.29333/ejgm/115850
12. Indicators of the cancer service of the Republic of Kazakhstan for 2018 (statistical and analytical materials). Ministry of health of the Republic of Kazakhstan. Kazakh research Institute of Oncology and radiology. 2018; 114-116. (http://onco.kz/)
13. Chen Y-Y, Tsai Y-T, Tsai M-S, et al.: Treatment outcomes of locally advanced hypopharyngeal squamous cell carcinoma. Therapeutic Radiology and Oncology. 2018, 2:10.21037/tro.2018.03.02
14. Takes RP, Strojan P, Silver CE, Bradley PJ, Haigentz M Jr, Wolf GT et al. Current trends in initial management of hypopharyngeal cancer: the declining use of open surgery. Head Neck 2012; 34:270–81.
15. Chu P.Y., Chang S.Y. Reconstruction of the hypopharynx after surgical treatment of squamous cell carcinoma. J Chin Med Assoc 2009;72(7):351–5. DOI: 10.1016/S1726-4901(09)70386-7.
16. Cooper JS, Porter K, Mallin K, Hoffman HT, Weber RS, Ang KK, et al.National Cancer Database report on cancer of the head and neck: 10-yearupdate. Head Neck. (2009) 31:748–58. doi: 10.1002/hed.21022
17. Takes RP, Strojan P, Silver CE, et al. Current trends in initial management of hypopharyngeal cancer: the declining use of open surgery. Eisele DW, ed. Head Neck. (2012) 34:270–81. doi: 10.1002/hed.21613
18. Hoffman HT, Karnell LH, Funk GF, Robinson RA, Menck HR. The National Cancer Data Base Report on cancer of the head and neck. Arch Otolaryngol Head Neck Surg 1998; 124:951–62.
19. Habib A: Management of advanced hypopharyngeal carcinoma: systematic review of survival following surgical and non-surgical treatments. J Laryngol Otol. 2018, 132:385-400. 10.1017/S0022215118000555
20. Cooper JS, Porter K, Mallin K, Hoffman HT, Weber RS, Ang KK, Gay EG, Langer CJ: National cancer database report on cancer of the head and neck: 10-year update. Head Neck 2009, 31:748–758.
21. Chan YW, Ng RW, Liu LH, Chung HP, Wei WI: Reconstruction of circumferential pharyngeal defects after tumour resection: reference or preference. J Plast Reconstr Aesthet Surg 2011, 64:1022–1028.
22. Sharaf B, Xue A, Solari A, Boa O, Liu J, Hanasono MM et al (2017) Optimizing outcomes in pharyngoesophageal reconstruction and neck resurfacing: 10-year experience of 294 cases. Plast Reconstr Surg 139(1):105–119. https://doi.org/10.1097/ PRS.0000000000002915
23. Chan JYW, Wei WI. Current management strategy of hypopharyngeal carcinoma. Auris Nasus Larynx. (2013) 40:2–6. doi: 10.1016/j.anl.2011.11.009

24. Bova R, Goh R, Poulson M, Coman WB. Total pharyngolaryngectomy for squamous cell carcinoma of the hypopharynx: a review. Laryngoscope 2005; 115:864–9.
25. Samant S, Kumar P, Wan J, et al. Concomitant radiation therapy and targeted cisplatin chemotherapy for the treatment of advanced pyriform sinus carcinoma: disease control and preservation of organ function. Head Neck 1999; 21:595-601
26. S.B. Irimbetov «The Problems of Nutritive Support of the Presurgical Period among the Patients with Cancer of Organs of a Gastrointestinal Tract» «Research Journal of Medical Sciences» (ISSN: 1815-346) Volume 10 Issue 5, 2016, P. - 481-486.
27. Nouraei SAR, Dias A, Kanona H, Vokes D, O'Flynn P, Clarke PM et al (2017) Impact of the method and success of pharyngeal reconstruction on the outcome of treating laryngeal and hypopharyngeal cancers with pharyngolaryngectomy: a national analysis. J Plast Reconstr Aesthet Surg 70(5):628–638. https://doi. org/10.1016/j.bjps.2016.12.009
28. Parmar S, Al Asaadi Z, Martin T, Jennings C, Pracy P (2014) The anterolateral fasciocutaneous thigh fap for circumferential pharyngeal defects—can it really replace the jejunum? Br J Oral Maxillofac Surg 52(3):247–250. https://doi.org/10.1016/j.bjoms .2013.12.008
29. Chepeha DB (2018) Salvage laryngectomy and laryngopharyngectomy: A multicenter review of outcomes associated with a reconstructive approach Microvascular Committee of the American Academy of Otolaryngology-Head and Neck Surgery. Head Neck 1–14. https://doi.org/10.1002/hed.25192
30. Chen WF, Chang KP, Chen Ch, Shyu VB, Kao HK (2013) Outcomes of anterolateral thigh fap reconstruction for salvage laryngopharyngectomy for hypopharyngeal cancer after concurrent chemoradiotherapy. PLoS ONE 8(1): e53985. https://doi. org/10.1371/journal.pone.0053985
31. Balasubramanian D, Subramaniam N, Rathod P, et al. Outcomes following pharyngeal reconstruction in total laryngectomy - Institutional experience and review of literature. Indian J Plast Surg. 2018;51(2):190-195. doi: 10.4103/ijps.IJPS_79_17
32. Chu PY, Chang SY (2009) Reconstruction of the hypopharynx after surgical treatment of squamous cell carcinoma. J Chin Med Assoc 72(7):351–355. https://doi.org/10.1016/S1726 4901(09)70386-7
33. Sharaf B, Xue A, Solari A, Boa O, Liu J, Hanasono MM et al (2017) Optimizing outcomes in pharyngoesophageal reconstruction and neck resurfacing: 10-year experience of 294 cases. Plast Reconstr Surg 139(1):105–119. https://doi.org/10.1097/ PRS.0000000000002915
34. Nouraei SAR, Dias A, Kanona H, Vokes D, O'Flynn P, Clarke PM et al (2017) Impact of the method and success of pharyngeal reconstruction on the outcome of treating laryngeal and hypopharyngeal cancers with pharyngolaryngectomy: a national analysis. J Plast Reconstr Aesthet Surg 70(5):628–638. https://doi. org/10.1016/j.bjps.2016.12.009
35. Perez-Smith D, Wagels M, Theile DR (2013) Jejunal AQWfree fap reconstruction of the pharyngolaryngectomy defects: 368 Consecutive cases. J Plast Reconstr Aesthet Surg 66(1):9–15 https:// doi.org/10.1016/j.bjps.2012.08.033
36. Parmar S, Al Asaadi Z, Martin T, Jennings C, Pracy P. The anterolateral fasciocutaneous thigh flap for circumferential pharyngeal defects–can it really replace the jejunum? Br J OralMaxillofac Surg 2014;52(03):247–250
37. Chen HC, Ciudad P, Chen SH, Agko M. Thirty-five years of single surgeon experience in the reconstruction of esophagus and voice with free ileocolon flap following total pharyngolaryngectomy. J Surg Oncol 2018;117(03):459–468
38. Sharaf B, Xue A, Solari MG, et al. Optimizing outcomes in pharyngoesophageal reconstruction and neck resurfacing: 10-year experience of 294 cases. Plast Reconstr Surg 2017;139(01):105e–119e
39. Van Brederode TD, Halmos GB, Stenekes MW (2017) Functional outcome after one-stage fap reconstruction of hypopharynx following tumor ablation. Eur Arch Otorhinolaryngol 274(2):969–976. https://doi.org/10.1007/s00405-016-4279-8
40. Chu PY, Chang SY (2009) Reconstruction of the hypopharynx after surgical treatment of squamous cell carcinoma. J Chin Med Assoc 72(7):351–355. https://doi.org/10.1016/S1726 4901(09)70386-7
41. Ho MW, Houghton L, Gillmartin E, et al. Outcomes following pharyngolaryngectomy reconstruction with the anterolateral thigh (ALT) free flap. Br J OralMaxillofac Surg 2012;50(01):19–24