



Received: 04 January 2026

Revised: 22 January 2026

Accepted: 23 February 2026

Published: 12 March 2026

Page No - 26-35

DOI - 10.55640/ijmsdh-12-03-04

Article Citation: Dhahi, K. N., Issa, S. A., & Mohammed Subhi. (2026). Comparative Study of frozen Section with Histopathology of Primary Site in OSCC. International Journal of Medical Science and Dental Health, 12(03), 26-35. <https://doi.org/10.55640/ijmsdh-12-03-04>

Copyright: © 2026 The Authors. Published by IJMSDH under the Creative Commons CC BY License

Comparative Study of frozen Section with Histopathology of Primary Site in OSCC

Kahlid Nawaf Dhahi

Department of Surgery, College of Dentistry, University of Babylon, Iraq

Sabah Abdulaziz Issa

Medical City, Specialized Surgery Hospital, Iraq

Mohammed Subhi Kamal

Medical City, Specialized Surgery Hospital, Iraq

Abstract

Background: Oral squamous cell carcinoma (OSCC) is largely a disease of older adults, occurring most commonly in patients older than age 45. Surgery was a principal modality of treatment and gaining microscopically negative resected margins are possible the most significant prognostic factor for a patient with a head and neck squamous cell carcinoma (HNSCC) and accordingly Frozen section (FS) evaluation was used to confirm negative margins. **Aim of study:** To compare the accuracy of frozen section FS with permanent histological examination of the same primary site margins and to improve the validity of FS during intra-operative operations. **Methods:** The researchers reviewed frozen section examination of the resection surfaces of 13 patients surgically treated for oral squamous cell carcinoma during the period October 2020 to October 2021 when close or positive margins was present at the resection surface, re-resection 0.5 cm was performed. Then after final histopathological study obtained, we compare it with FS result to evaluate the accuracy of FS. **Results:** A total of 39 margins were evaluated from 13 individuals. With a p value of 0.001, all margins exhibited highly significant concordance with the permanent section of the same tissue sample. **Conclusion:** Frozen section histopathological study data, sensitivity, specificity and accuracy, showed highly significant p value result which improve its validity intraoperatively this result was confirmed by permanent histopathological study.

Keywords: OSCC, HNSCC, FS Evaluation, CAL, BOP, PI, GI



Introduction

Oral squamous cell carcinomas (OSCCs) are cancers that develop from the mucosa of the oral cavity and oropharynx. They are a disease that affects older people, with the majority of cases occurring in those over the age of 45 (Majchrzak et al., 2014). They are the world's third largest cause of cancer death. Squamous cell carcinomas make up the great majority (more than 90%), and they usually develop in the oropharynx, oral cavity, hypopharynx, or larynx. The formation of head and neck squamous cell carcinoma (HNSCC) is complex, since it is the consequence of the interplay of environmental variables and genetic inheritance (Galbiatti et al., 2013).

One of the most significant prognostic variables in oral squamous cell carcinoma is surgical margin status. When the resection margins are insufficient, local failures are more common. The influence of surgical margin status on overall survival, on the other hand, is still a point of contention. Some have found a decline in survival with a close/positive margin, while others have demonstrated that it has no effect on total survival (Mair et al., 2017). Lower local tumor recurrence rates and improved survival have been reported when tumor-free margins are achieved at the time of surgery (DiNardo et al., 2000; Black et al., 2006).

When surgery is utilized, it is critical to have a well-controlled radical excision of the tumor with a safe margin of more than 5 mm. It has been claimed that attaining clean surgical cut surfaces of the margin, which is dependent in large part on removing the tumor and all of its microscopic expansions, would result in improved local control of malignant illness (Gooris et al., 2003).

The challenge of adequate margins is important to the effective care of patients with head and neck cancer. The method (FS) has been demonstrated to be sufficiently accurate for clinical use and has become a standard of practice for the intraoperative diagnosis of newly found lesions as well as confirmation of diagnosis in previously biopsied pathologic processes and determining the degree of illness (Layfield et al., 2018).

Surgery, radiation, and/or chemotherapy are used depending on the tumor's respectability and location, as well as if an organ preservation strategy is possible. Surgical therapy is the most common treatment choice for primary and secondary malignancies, as well as recurring cancer (Galbiatti et al., 2013; Coca-Pelaz et al., 2018).

The aim of this study was to compare the accuracy of frozen section (FS) analysis with permanent histopathological

examination of margins obtained from the same primary tumor site, and to enhance the validity and reliability of FS assessment during intraoperative surgical procedures.

Patients and Methods

Study design:

Data were prospectively collected from 13 patients and age ranged from 31-80 years old, all patient have been treated in Maxillofacial Center at Al-Shaheed Ghazi Alhariri Teaching Hospital/ Baghdad/ Iraq. All patient presented with OSCC

- The study covered the period between October 2020 and August 2021.
- The following parameter were evaluated in our study: primary site distribution and accuracy of FS.
- The excised primary OSCC site margins of all cases were submitted immediate frozen section examination, with the remaining tissue submission for permanent histopathological study. Finally after obtaining all histopathological data from FS and final histopathology we compare the result and get FS accuracy.

Inclusion criteria:

- Soft tissue SCC.
- Fit for surgery.

Exclusion criteria:

1. All surgical margins excised by electrical cautery.
2. Bone and not clear surgical margins were excluded from the study.

Materials

The primary site for the FS investigation was delivered in a normal saline container because frozen sections require fresh samples rather than dry samples to provide a more accurate study.

Methods:

Surgical work:

- 1 . Patient in supine position under general anesthesia GA.
- 2 . Surgical area (primary site and neck) disinfected.

- 3 . Draping
 - 4 . Neck dissection to excised lymph nodes LN
 - 5 . After obtaining clear neck from LN, now primary site excised with 1.5 cm except in single case of lower lip
 - 6 . The sides of primary site labeled with silk suture, each margin side was having a different silk threads number
- SCC the safe margins were 1 cm as shown in figure below 3.A. 1



Figure 1: Lower lip SCC with 1 cm excised margins delineated by aseptic roller.

Histopathological work:

Excellent gross examination of excised tumor margins, slicing 2-3 mm thickness and 0.5-1.5 cm diameter slice sampling clear without crushing samples. then, labeling each slice with ordered numbers or any simple to memorized capital letters and put onto the cryostat for freezing (freezing temperature inside machine was about -20° to -35° C mostly was -28° C). And then for sectioning sample sections cut for 5-7 micrometer by rotary

microtome, then picked up on glass slide, which are at that point ready for staining with a modified hematoxylin and eosin (H&E) stains.

- This whole process (from receiving the sample until the delivery of the slides for microscopic examination) takes no more than 11-18 minutes.
- The remaining primary tumor tissues were definitively diagnosed then after with final permanent



histopathological study in order to compare the results of FS.

- Next step, the pathologist examine these slides carefully under the light microscope in order to evaluate margins sample and arrived at a finding.
- The outcomes of frozen sections were compared with permanent sections regarding the negative, close or positive histopathological diagnosis for the OSCC margins. The result of comparison evaluates the validity of FS.

Freezing tissue:

- The chuck should be dry and clean and we must put Cryogel or OTC onto the chuck which has been pre-cooled in a cryostat.
- A nylon brush can be used to take away tissue and OCT from stage.
- Dunking the chuck in alcohol to eliminate frost particles.
- Replace the chuck in place.
- Size of tissue sample slice between 3mm - 5mm in thickness.
- The more even and deep the freeze, the smaller the tissue.
- Lay the tissue on the chuck and quickly pour media over it, replace the chuck quickly (loaded with specimen) into its in freezing shelf.

Cryosectioning:

- Place the chuck in proper position (on rotary stage) fully facing the cryostat blade, place the block towards the blade of the cutting blade.
- Continuously turn the wheel with your right hand with out stopping; avoid speeding up or slowing down.
- Set cryosectioning thickness at 10 micrometers to remove excess frozen media.
- As cutting reach tissue, utilizing a paintbrush with stiff bristles and a large gripping surface that has been precooled, to prevent tissue folding or curling, and also remove cotted frozen media away.

- Hold the brush in your left hand at an angle, as if it were a pen.
- For added stability, place your fifth finger on the stage.
- Continue turning the wheel to obtain uniform tissue thickness, don't stop the wheel at the start of the sectioning, in order to eliminate section thickness variations and tissue folding.
- Drag the brush in coordination with the chuck as it approaches the blade; your brush should move down at the same rate as the chuck.
- Gently laid the glass slide upon the tissue section, into melt to glass surface.
- While waiting for the stain line, prepared slides should be immersed in formal alcohol, 95 percent alcohol (methanol/ethanol), or formalin; if this step is skipped, drying distortions will occur.
- Optimal cutting thickness is 5-7 micrometer, deeper tissue obtained after approximately 20 turns.

Preparing the slides for staining:

- Make Sure to keep all stains and solutions as fresh as possible.
- For H&E staining, dip the slide in the following chemicals in the following order:

Fix in 95 percent ethanol right away (even a delay of 15 seconds can result in substantial artifacts) Formal alcohol, formalin or 95% alcohol for 45 - 60 seconds

- Hematoxylin: 60 seconds
- Water: 5 - 10 seconds
- Eosin: 30 - 60 seconds
- Water 5-10 second

Reverse fixation

- 70 % alcohol: 10 second
- 95% alcohol: 10 seconds
- 100% alcohol: 10 seconds
- Xylene: 10 second
- At that moment, for cover sliding, add mounting media.



NOW, prepared slides ready for microscopic evaluation.

Statistical analysis:

IBM SPSS (Statistical Package for the Social Sciences) Statistics Version 22 was used for data tabulation, input, and coding.

Cohen's kappa (κ) calculates inter-observer agreement was used to test the agreement between the two methods of assessment, Value of κ Strength of agreement: < 0.20 indicates poor agreement, 0.21 - 0.40 indicates fair agreement, 0.41 - 0.60 indicates moderate agreement, 0.61 - 0.80 indicates strong agreement, and 0.81 - 1.00 indicates very good agreement.

Results

There were 13 patients in this study, with an average age of 59.3 ± 15.1 years and a range of 31 to 80 years, with 9 (69.2%) males and 4 (30.8%) females. The tongue was the most commonly affected site, with 7 (53.8%) cases, followed by 2 (15.4%) cases for the lower lip, and one case (7.7%) for each of the mandibular alveolar and maxillary mucosa and maxillary vestibule. Table 3.1 shows the results.

Table 1. Basic characteristics of the study sample A& B

| Variables | Statistics | |
|---------------------|-----------------|----------|
| Age | | |
| Mean \pm SD | 59.3 \pm 15.1 | |
| Median (min-max) | 60.0 (31-80) | |
| Gender | | |
| | Number | % |
| Male | 9 | 69.2 |
| Females | 4 | 30.8 |
| Site | | |
| | Number | % |
| Tongue | 7 | 53.8 |
| Lower lip | 2 | 15.4 |
| Alveolar mucosa | 1 | 7.7 |
| Maxillary mucosa | 1 | 7.7 |
| Maxillary vestibule | 1 | 7.7 |
| Palate | 1 | 7.7 |

There were two slides (5.2 %) that revealed positive frozen section results and one slide close margin (2.56%) from the total study sample, as shown in Figure1.

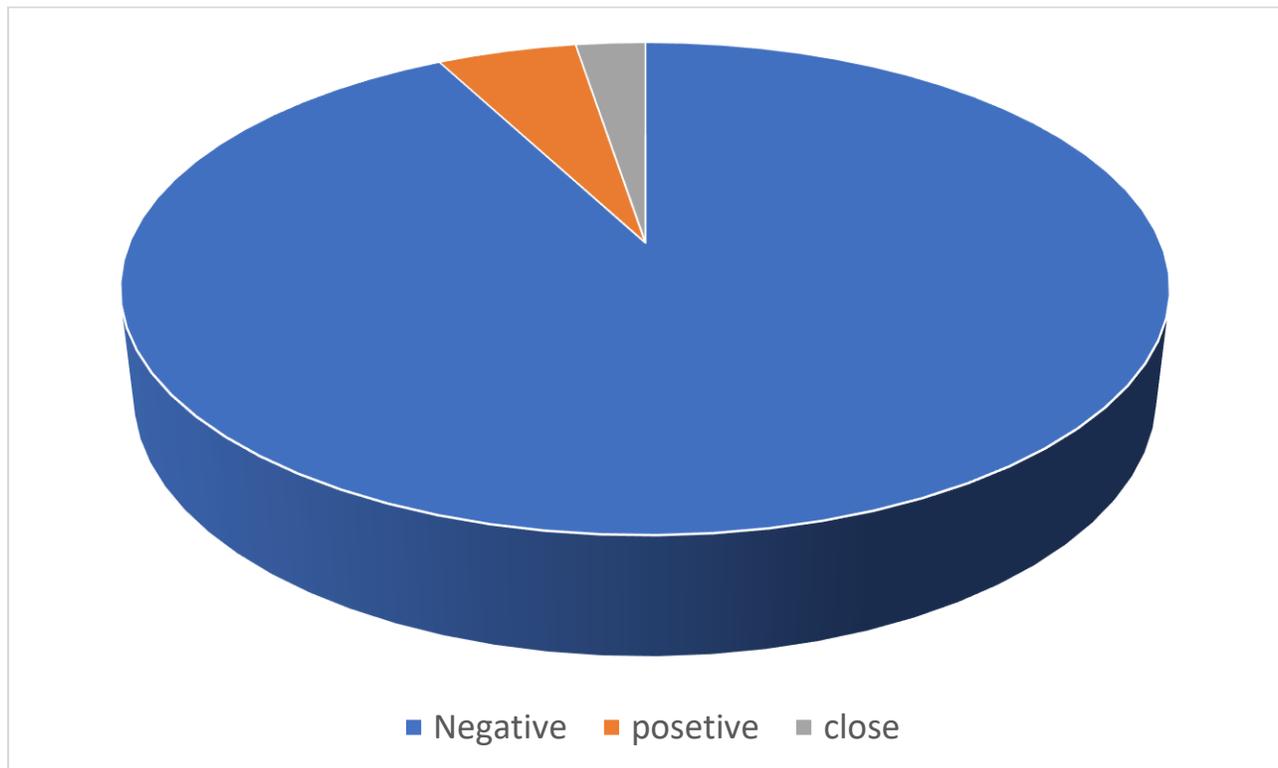


Figure 2. Pie chart for the prevalence of negative, close and positive margins in frozen section

Those cases were both tongue squamous cell carcinomas (SCC), first was a 74-year-old male, and the second was a 42-year-old male, and both revealed positive and close margin involvement in permanent histopathology respectively.



Table 2. Results of each patient enrolled in the study

| Number | Age | Gender | Frozen section/Permanent results | | | Site |
|--------|-----|--------|----------------------------------|----------|-------------------|---------------------|
| | | | Distal | Depth | Questionable area | |
| 1# | 74 | Male | Negative | Positive | Positive | Tongue |
| 2 | 31 | Female | Negative | Negative | Negative | Tongue |
| 3* | 58 | Male | Negative | Negative | Negative | Lower lip |
| 4 | 35 | Male | Negative | Negative | Negative | Palate |
| 5# | 42 | Male | Negative | Negative | Close | Tongue |
| 6 | 64 | Male | Negative | Negative | Negative | Maxillary vestibule |
| 7 | 66 | Female | Negative | Negative | Negative | Alveolar mucosa |
| 8 | 60 | Female | Negative | Negative | Negative | Tongue |
| 9 | 70 | Female | Negative | Negative | Negative | Tongue |
| 10 | 58 | Male | Negative | Negative | Negative | Maxillary mucosa |
| 11 | 59 | Male | Negative | Negative | Negative | Tongue |
| 12 | 80 | Male | Negative | Negative | Negative | Tongue |
| 13 | 74 | Male | Negative | Negative | Negative | Lower lip |

*: The safe margin was 1 CM

#: Additional safe margin was taken.



The agreement was 100% between the frozen section results and permanent histopathology results, as the two cases that were positive and close by permanent histopathology revealed the same results by frozen section, with 100% sensitivity, specificity, and accuracy. As shown in Table-3.

Table 3: Diagnostic testing between frozen section and permanent histopathology slides

| Results | | Permanent histopathology | | | Total |
|------------------------------|----------|--------------------------|--|------------|-----------|
| | | Positive | Close | Negative | |
| | | No. (%) | No. (%) | No. (%) | |
| Frozen section | Positive | 2 (100%) | | 0 (0.0) | 2 (5.2) |
| | Negative | 0 (0.0) | | 36 (100.0) | 36 (92.3) |
| | Close | | 1(100.0) | | 1 (2.56) |
| Diagnostic tests | | Value | 95% Confidence interval (lower-higher) | | |
| Sensitivity | | 100% | 15.8%-100% | | |
| Specificity | | 100% | 90.5%-100% | | |
| Accuracy | | 100% | 90.1%-100% | | |
| Agreement (Kappa, κ) | | 1.0 (P-value <0.001) | | | |

Discussion

Achievement of clear negative surgical margins microscopically during cancer surgery is very important prognostic factor to reduce recurrence rate at surgical site (Woolgar, 2006). FS is a rapid histopathological examination study which give us confirmations for clean surgical safe margins intraoperatively that leading for decreasing the probability for another surgery and suffering of patient. FS also increase satisfaction of patients and their relative postoperatively when they know the cancer was completely excised with safe margins. In our study we compare FS result by permanent paraffin embedded histopathological study result to measure sensitivity, specificity and accuracy.

Preparing a sliced tissue sample for permanent final histopathological examination take longer time (one day) but have superior quality than FS (Jacobs et al., 2001).

The safe margins submitted for FS section evaluation in our study were from the edge of the excised primary site, which included distal (most posterior side), deep margin (which relied on tumor site, e.g., mucosal tissue meaning inferior margin and tongue and palate meaning medial margin), and questionable area, which included any other suspected area; other surgeons may prefer a surgical bed.

The primary reason for doing a frozen section is to acquire a definitive rapid diagnosis on which to base a surgical decision (Gal, 2005). The first type of frozen section mistake is interpretative, resulting from tissue architectural deformation during the freezing process, unequal sectioning, or inadequate staining, all of which enhance the chance of this type of error. The second type of mistake is sampling error, which is the most frequent type of error and can occur at any stage during the process (Mair et al., 2017; Du et al., 2016). In our study error rate was zero, this may be linked to case selection and careful sample



delivering and gentle handling of sample sectioning for FS section study.

It is well acknowledged that, in addition to giving a rapid diagnosis of malignancy, frozen section evaluation plays an essential role in identifying the extent of the resected tumor and the surrounding margins intraoperatively especially in functional regions such as eye and nose, as a result, greater safety margins that risk a certain proportion of noninvolved tissue are problematic, and frozen sections are recommended as the preferred procedure (Gooris et al., 2003; Menesi et al., 2014; Gal, 2005). In our study FS examination done for cut surface, margin should have normal tissue confined by cut surface. Margins consider positive only when involved by cancer cells.

All tumors excised with or more than 1.5 cm safe margins and specific side of primary tumor site submitted for FS study to confirm microscopically negative margins except in single case of lower lip SCC with stage I, where the resected margin was 1 cm. all studied margins sides demonstrate concordance with permanent paraffin embedded final results. In our study.

In our study we looked at a number of factors, including age, gender, and location. The majority of safe margins had a negative FS and final histopathological study. Pankaj Chaturvedi et al. (2012) investigated another measure, tumor thickness, and discovered a link between tumor thickness and the occurrence of positive margins (Chaturvedi et al., 2012).

In our study, the most involved site by SCC was the tongue (53.8%). This increased rate of tongue SCC may be due to a variety of factors, including the patient's inability to detect abnormal changes in his or her tongue, sharp teeth, patient apathy, seeking treatment late, and missing diagnosis of SCC ulcers that appear small, causing general practitioner (GP) dentists to miss the diagnosis. Eleanor M. Layfield et al. (2017) study which showed agreement to our study (Layfield et al., 2018). Sharma SM et al. (2009) study showed buccal mucosa most involved site which disagree to our study, this disagreement may be due to betel quid chewing habit which widely used in India (Sharma et al., 2009). Berta Demir et al. (2020) in his study showed the tongue was most involved site which agree to our data (Demir et al., 2020). Shun Miyota et al. (2014), his study showed agreement with tongue most involved site (Miyota et al., 2014).

The data from frozen section investigations and final paraffin embedded permanent histopathological studies were perfectly matched in our study. The accuracy, sensitivity, and specificity were all at 100%. The agreement between the two techniques of assessment (frozen and permanent

histopathological investigation) was tested using Cohen's kappa, which estimates inter-observer agreement, and the result was 1.0 (P-value 0.001). Compared to other similar research with extremely significant values for frozen section accuracy > 90%, no single report has reached 100%. This close agreement with other studies could be due to the fact that we used only a few patients and had a low number. Manish Mair et al. (2016) study showed the sensitivity and specificity of frozen section is 45.45% and 98.8% respectively (Mair et al., 2017). Eleanor M. Layfield et al. (2017) study show sensitivity and specificity 89%, 99% respectively (Layfield et al., 2018). Surabhi Pandey et al. (2020) study showed percentage of sensitivity, specificity and accuracy were 78.57, 99.55, and 98.32 respectively (Pandey et al., 2020). Berta Demir et al. (2020) in his study showed percentage of specificity, sensitivity and accuracy 96%, 99%, and 96% respectively (Demir et al., 2020).

Conclusion

The permanent histopathological examination confirmed the validity of the frozen section (FS) findings. The use of FS reduced the need for excessively wide safety margin resections, particularly in T1 tumors and in esthetically and functionally sensitive regions, thereby decreasing postoperative morbidity. In addition, FS increased the likelihood of achieving histologically negative surgical margins. Compared with waiting 10–14 days for results from permanent paraffin-embedded histopathological examination, intraoperative FS provided psychological reassurance to patients and their relatives by confirming complete tumor excision with safe margins at the time of surgery. However, FS has certain limitations, including increased intraoperative time and higher procedural costs.

Reference

1. Black, C., Marple, B. F., Daramola, O. O., & Weed, D. T. (2006). Critical evaluation of frozen section margins in head and neck cancer resections. *Cancer*, 107(12), 2792–2800. <https://doi.org/10.1002/cncr.22318>
2. Chaturvedi, P., Datta, S., Nair, S., Nair, D., Pawar, P., Vaishampayan, S., & Chaukar, D. (2012). Tumor thickness and depth of invasion as predictors of nodal metastasis in oral tongue squamous cell carcinoma. *Head & Neck*, 34(3), 332–336. <https://doi.org/10.1002/hed.21714>
3. Coca-Pelaz, A., Takes, R. P., Hutcheson, K., Saba, N. F., Haigentz, M., Bradford, C. R., de Bree, R., Strojjan, P., Lund, V. J., Mendenhall, W. M., Nixon, I. J., Quer, M.,



- Rinaldo, A., & Ferlito, A. (2018). Head and neck cancer: A review of the impact of treatment delay on outcome. *Advances in Therapy*, 35(2), 153–160. <https://doi.org/10.1007/s12325-018-0663-7>
4. Demir, B., Ozer, E., Aydin, U., & Yilmaz, T. (2020). Accuracy of frozen section in the assessment of surgical margins in oral squamous cell carcinoma. *Journal of Cranio-Maxillofacial Surgery*, 48(3), 274–279. <https://doi.org/10.1016/j.jcms.2019.12.005>
 5. DiNardo, L. J., Lin, J., Karageorge, L. S., & Powers, C. N. (2000). Accuracy, utility, and cost of frozen section margins in head and neck cancer surgery. *The Laryngoscope*, 110(10), 1773–1776. <https://doi.org/10.1097/00005537-200010000-00039>
 6. Du, E., Mazhar, K., & Dhingra, J. (2016). Frozen section analysis of margins in head and neck cancer surgery. *Oral Oncology*, 62, 7–12. <https://doi.org/10.1016/j.oraloncology.2016.09.006>
 7. Gal, A. A. (2005). The utility of frozen section in surgical pathology. *Archives of Pathology & Laboratory Medicine*, 129(12), 1525–1528. <https://doi.org/10.5858/2005-129-1525-TUOFSI>
 8. Galbiatti, A. L. S., Padovani-Junior, J. A., Maniglia, J. V., Rodrigues, C. D. S., Pavarino, E. C., & Goloni-Bertollo, E. M. (2013). Head and neck cancer: Causes, prevention and treatment. *Brazilian Journal of Otorhinolaryngology*, 79(2), 239–247. <https://doi.org/10.5935/1808-8694.20130041>
 9. Gooris, P. J. J., Vermey, A., Roodenburg, J. L. N., & Reintsema, H. (2003). Frozen section analysis of resection margins in oral cancer surgery. *Journal of Oral and Maxillofacial Surgery*, 61(2), 153–158. <https://doi.org/10.1053/joms.2003.50032>
 10. Gooris, P. J., Vermey, B., de Visscher, J. G., & Roodenburg, J. L. (2003). Frozen section examination of the margins for resection of squamous cell carcinoma of the lower lip. *Journal of Oral and Maxillofacial Surgery*, 61(8), 890–894. [https://doi.org/10.1016/S0278-2391\(03\)00245-3](https://doi.org/10.1016/S0278-2391(03)00245-3)
 11. Jacobs, L., DasGupta, T. K., & Shaw, H. (2001). Comparison of frozen section and permanent histology in surgical pathology. *The American Journal of Surgery*, 182(6), 637–641. [https://doi.org/10.1016/S0002-9610\(01\)00807-9](https://doi.org/10.1016/S0002-9610(01)00807-9)
 12. Layfield, E. M., Schmidt, R. L., Esebua, M., & Layfield, L. J. (2018). Frozen section evaluation of margin status in primary squamous cell carcinomas of the head and neck: A correlation study of frozen section and final diagnoses. *Head and Neck Pathology*, 12(2), 175–180. <https://doi.org/10.1007/s12105-017-0846-6>
 13. Layfield, E. M., Schmidt, R. L., Esebua, M., & Layfield, L. J. (2018). Frozen section evaluation of margins in head and neck squamous cell carcinoma. *Head and Neck Pathology*, 12(2), 175–182. <https://doi.org/10.1007/s12105-017-0838-6>
 14. Mair, M., Nair, D., Nair, S., Chaturvedi, P., & Chaukar, D. (2017). Utility of frozen section in surgical margins of oral cancer. *Indian Journal of Cancer*, 54(2), 352–356. https://doi.org/10.4103/ijc.IJC_199_16
 15. Mair, M., Nair, D., Nair, S., Dutta, S., Garg, A., Malik, A., Mishra, A., Shetty, R. K., & Chaturvedi, P. (2017). Intraoperative gross examination vs frozen section for achievement of adequate margin in oral cancer surgery. *Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology*, 123(5), 544–549. <https://doi.org/10.1016/j.oooo.2016.11.018>
 16. Majchrzak, E., Szybiak, B., Wegner, A., Pienkowski, P., Pazdrowski, J., Luczewski, L., & Golusinski, W. (2014). Oral cavity and oropharyngeal squamous cell carcinoma in young adults: A review of the literature. *Radiology and Oncology*, 48(1), 1–10.
 17. Menesi, W., Adly, O., & El-Bakry, A. (2014). Role of frozen section in head and neck cancer surgery. *The Journal of Laryngology & Otology*, 128(7), 640–645. <https://doi.org/10.1017/S0022215114001317>
 18. Miyota, S., Sakuraba, M., Nagamatsu, S., & Hayashi, R. (2014). Clinical significance of frozen section diagnosis of surgical margins in tongue cancer. *Auris Nasus Larynx*, 41(2), 188–193. <https://doi.org/10.1016/j.anl.2013.09.004>
 19. Pandey, S., Singh, S., Saxena, S., & Singh, R. (2020). Diagnostic accuracy of frozen section in margin assessment of oral squamous cell carcinoma. *Journal of Oral Biology and Craniofacial Research*, 10(3), 230–234. <https://doi.org/10.1016/j.jobcr.2020.04.002>
 20. Sharma, S. M., Reddy, R. V., & Srinivas, K. (2009). Epidemiological trends of oral squamous cell carcinoma in India. *Indian Journal of Dental Research*, 20(1), 12–16. <https://doi.org/10.4103/0970-9290.49057>
 21. Woolgar, J. A. (2006). Histopathological prognosticators in oral and oropharyngeal squamous cell carcinoma. *Oral Oncology*, 42(3), 229–239. <https://doi.org/10.1016/j.oraloncology.2005.05.008>