Histological Diagnosis of Oral Lesions with Cutting Needle Biopsy: a Pilot Study

José Antonio Rossi dos Santos[1], Diogo Lenzi Capella[1], Rafaela Elvira Rozza[1], Stefânia Jeronimo Ferreira[1], Soraya de Azambuja Berti-Couto[2], Manoel Sant'Ana-Filho[2,3], Antonio Adilson Soares de Lima[4], Fernando Henrique Westphalen[1,4], Paulo Henrique Couto-Souza[1]

[1]Department of Stomatology, School of Dentistry, Pontifical Catholic University of Paraná, Brazil.
[2]Department of Stomatology, School of Dentistry, Pontifical Catholic University of Rio Grande do Sul, Brazil.
[3]Department of Oral Pathology, School of Dentistry, Federal University of Rio Grande do Sul, Brazil.
[4]Department of Stomatology, School of Dentistry, Federal University of Paraná, Brazil.

Corresponding Author:
Paulo Henrique Couto-Souza
Pontifícia Universidade Católica do Paraná
Centro de Ciências Biológicas e da Saúde
Curso de Odontologia
Imaculada Conceição, 1155, Prado Velho
CEP: 80215-901, Curitiba - PR
Brazil
Phone: +55 41 3271 1637 / +55 41 3271 1405
E-mail: couto.s@pucpr.br / souzaphc@yahoo.com.br

ABSTRACT

Objectives: The aim of this pilot study was to evaluate the effectiveness of cutting needle biopsy in the diagnosis of solid oral lesions.
Material and Methods: The biopsies were carried out on seven patients who presented with solid oral lesions with sizes ranging from 2 to 6 cm. Specimens were obtained from each lesion before conventional biopsies using a cutting needle with 18-gauge x 9 cm (MD TECH, Gainesville, FL, USA). A total of 64 specimens processed by hematoxylin-eosin staining method, were obtained. Afterwards, the analysis was performed by an oral pathologist, in two different stages, with and without the clinical history of each lesion. Then, these answers were compared with the final histological diagnosis.
Results: Results presented by the descriptive analysis showed that the correct diagnosis using cutting needle biopsy without the clinical history of lesions was registered in 37.5% of cases, while with the clinical history in 76.6%.
Conclusions: Despite the promising results as a potential technique for biopsies and histological diagnosis of oral lesions, the cutting needle biopsy should be analyzed carefully in those cases.

Keywords: biopsy; biopsy, needle; oral pathology; oral diagnosis; laboratory diagnosis.

Accepted for publication: 18 April 2011
To cite this article:
dos Santos JA, Capella DL, Rozza RE, Ferreira SJ, Berti Couto SA, Sant'Ana Filho M, de Lima AA, Westphalen FH, Couto Souza PH. Histological Diagnosis of Oral Lesions with Cutting Needle Biopsy: a Pilot Study.
J Oral Maxillofac Res 2011 (Apr-Jun);2(2):e3
URL: http://www.ejomr.org/JOMR/archives/2011/2/e3/v2n2e3ht.pdf
doi: 10.5037/jomr.2011.2203

INTRODUCTION

Cutting needle was firstly described in 1931, when Hoffman [1] presented this instrument as a new method for biopsy. The methods used at that time, like conventional biopsy, cautery, suction or "punches" were satisfactory, however, they presented some disadvantages like greater trauma and sometimes, insufficient material for microscopic analysis. In contrast, the new cutting needle biopsy (CNB) method was a faster, safely and less morbid technique and it could be performed under local anaesthesia, providing a tissue specimen for a reliable histological diagnosis [2-4]. Consequently, this technique has been used for many years in lung [5], liver [3], breast [4], lymph nodes [6] and kidney [7] biopsies. However, there are only a few studies related to the use of CNB in head and neck regions [8].

Yamashita et al. [9] were one of the first authors who have investigated the use of CBN in intraoral lesions whose results showed that this method was safe and effective for the diagnosis of head and neck lesions including intraoral ones. In addition, Southam et al. [10] and Yuan and Li [6] have developed a study that described the use of an 18-gauge needle to obtain specimens of head and neck nodes, concluding that this method is valuable for the pathologists' interpretation. Besides, there are some studies which have been compared CNB with other biopsy methods like fine-needle aspiration, cytology and conventional biopsy [4,11-13].

Recently, some authors have reported high success rates concerning the use of CNB taking into account that this method provides adequate biopsy samples for an accurate histological diagnosis [8,13]. Therefore, this pilot study aimed to evaluate the effectiveness of cutting needle biopsy in the diagnosis of solid oral lesions.

MATERIAL AND METHODS

This study was approved by the Ethical Committee of the School of Dentistry at Pontifical Catholic University of Paraná (PUCPR), and by the National Council of Ethics in Research, Brazil.

Three male and four female patients (aged 32 to 81 years, mean age = 56.5 ± 15.7 years) from Stomatology Clinic at Pontifical Catholic University of Paraná, who presented with solid oral lesions with more than two centimetre of size were selected for the study. The lesions had not vascular origin, and needed conventional biopsy, partial or total, for their final diagnosis. The sequence to carry out the present study was done firstly using the cutting-needle biopsy (18-gauge x 9 cm needle, MD TECH, Gainesville, FL, USA) in each patient after local anaesthesia. Thus, the needle was calibrated to obtain the specimens of one centimetre and then was carefully inserted inside the lesion until the end of the cannula. At this moment, the patient was warned about the noise coming from the shooting procedure. After that, the needle was removed from the lesion and calibrated again, showing the entire cutting section and allowing the specimen removal, which was done carefully (Figures 1 A and B). At least three shots were done in each lesion, according to the studies of Lane [14], Kissin et al. [15] and Scope et al. [16] and the final number of sixty four specimens were obtained. Soon after the cutting needle biopsy procedure, conventional biopsy, partial or total, was performed in each lesion. All specimens were processed by the hematoxylin-eosin staining method. For this, each specimen was fixed in 10% buffered formalin and further embedded in paraffin. Sixty four paraffin blocks were prepared from the 65 specimens, and one histological slide with 4 µm thick section was obtained from each block.

Afterwards, the slides were showed randomly to a specialist in oral pathology and the analysis was

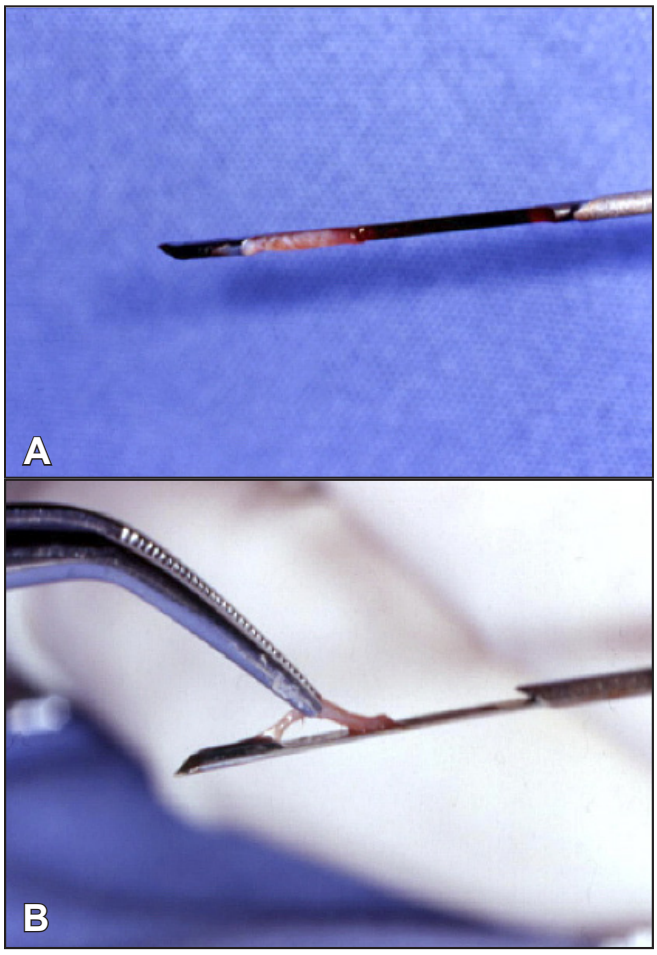

Figure 1. Photograph showing the tissue specimen:
A = in the cutting needle;
B = being removed from the needle cutting section.

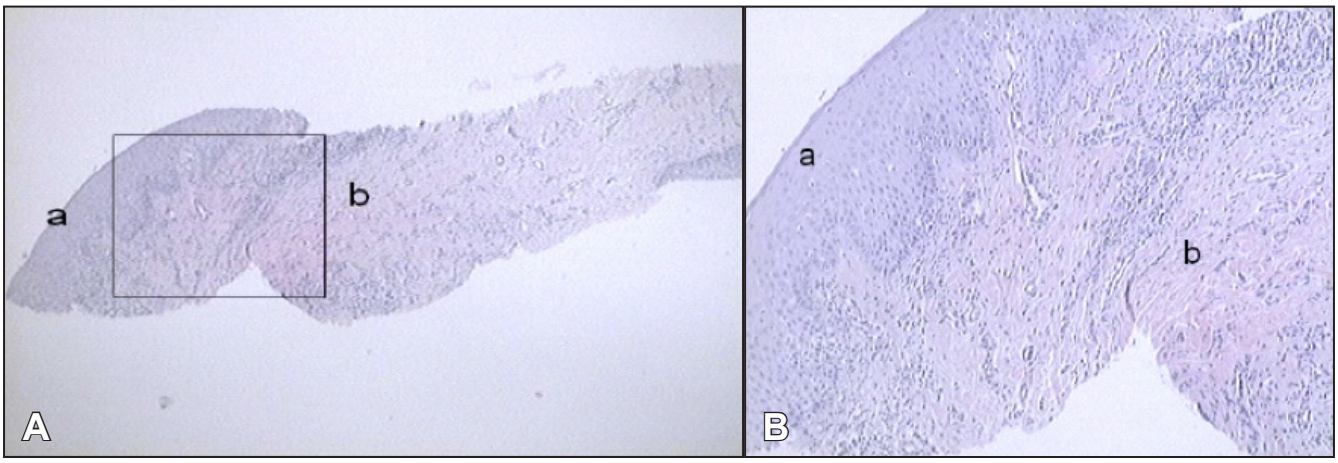

Figure 2. The histological specimen showing the histological view of fibrous inflammatory hyperplasia:
a = epithelium; b = conjunctive tissue.
A = hematoxylin and eosin stain, original magnification x40; B = hematoxylin and eosin stain, original magnification x100.

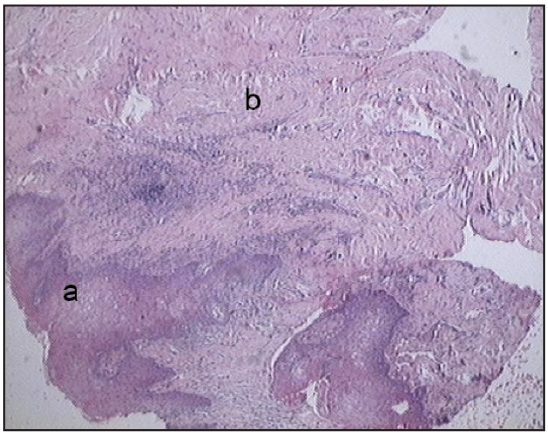

Figure 3. Histological diagnosis of fibrous inflammatory hyperplasia showed in the piece of the conventional biopsy:
a = epithelium; b = conjunctive tissue.
Hematoxylin and eosin stain, original magnification x40.

Table 1. Final histological diagnosis of conventional biopsy, size and location of the lesions

Case #	Final histological diagnosis	Size (cm)	Location
1	FIH1	5	Maxillary alveolar ridge
2	FIH 2	4	Lower buccal vestibule
3	FIH 3	6	Maxillary alveolar and buccal mucosa
4	FIH 4	2	Hard palate
5	FIH 5	2	Lower buccal vestibule
6	CGCG	3	Mandibular alveolar ridge
7	PGCG	2	Maxillary alveolar ridge

FIH = fibrous inflammatory hyperplasia; CGCG = central giant cell granuloma; PGCG = peripheral giant cell granuloma.

carried out in two stages, according to the following question: what is the histological diagnosis of each slide? In the first stage, the slides were analyzed without the clinical history of each lesion and in the second stage they were analyzed with the clinical history of each lesion. Finally, the pathologists' answers were compared with the "gold standard" result obtained from the histological diagnosis of the conventional biopsies (Figure 2 and Figure 3). A dichotomous scale of values (0-diagnosis coincident and 1-diagnosis non coincident) in relation to diagnosis obtained before and after the knowledge of the clinical history of each lesion was established.

RESULTS

Seven cases were included in this study and the final histological diagnosis after conventional biopsy, size and location of lesions are presented in table 1. There are five cases with the final diagnosis of fibrous inflammatory hyperplasia, one with the central giant cell granuloma and one with the peripheral giant cell granuloma. All solid lesions were located in the oral cavity and their sizes ranged from 2 to 6 cm.

Sixty four specimens were obtained prior to conventional biopsy using cutting needle biopsy method from the same lesions and analyzed microscopically. Results presented by descriptive analysis showed that the correct diagnosis using cutting needle biopsy without the clinical history of the lesions was registered in 37.5% of cases, while with clinical history in 76.6% (Table 2).

DISCUSSION

The present pilot study showed (Table 2) that, even without the knowledge of the clinical history, the number of cases with correct diagnosis was

Table 2. Final histological diagnosis, number of specimens/slices obtained for each lesion and number of correct cutting needle biopsy (CNB) diagnosis without and with clinical history

Final histological diagnosis	Number of specimens/slides for each lesion	Correct CNB diagnosis without clinical history	Correct CNB diagnosis with clinical history
FIH 1	6	5	6
FIH 2	12	6	9
FIH 3	21	1	15
FIH 4	8	3	8
FIH 5	8	4	6
CGCG	3	0	0
PGCG	6	5	5
Total	64	24 (37.5%)	49 (76.6%)

FIH = fibrous inflammatory hyperplasia; CGCG = central giant cell granuloma; PGCG = peripheral giant cell granuloma.

considerable (37.5%). It is important to point out that the reason to have presented the slides to the pathologist without any kind of clinical information was just because we wanted to check the potentiality of the specimens collected with the current cutting needle in order to provide the correct histological diagnosis. However, when the pathologist has known the clinical information, the number of coincident diagnosis was twice higher (76.6%) than those ones obtained without clinical information. Indeed, this was an expected result considering that it is much more difficult and not recommended to carry out histological diagnosis analyzing only the slides, without the clinical history. Furthermore, quality and quantity of the specimens obtained with a cutting needle with 18-gauge x 9 cm were satisfactory to carry out the microscopic analysis in the majority of cases. Nevertheless, in some cases, even with the knowledge of clinical history, the histological diagnosis of specimens was not coincident with the final diagnosis (23.4%). Probably, in those cases, the quantity and quality of the specimens were not satisfactory to carry out the correct histological diagnosis. This is a very important aspect and shows that the conventional biopsy technique cannot be fully substituted by the cutting needle biopsy one, concerning the histological diagnosis of oral lesions. The latter still has important limitations with regard quantity and quality of the specimens.

These results are also directly related to the following question: how many shots are necessary to obtain the specimens with a good quality for cutting needle biopsy? In the literature, some authors such as Lane [14], Kissin et al. [15] and Scope et al. [16] argued that three shots are sufficient to cover the entire lesion, while Southam et al. [10] stated that only two shots are needed. Jennings et al. [17] and Christopher et al. [18] obtained good results with three to six shots, but Bearcroft et al. [19], Abreu-Lima et al. [20], Farias et al. [21] and Lieberman et al. [22] repeated the procedure only when the specimen was insufficient clinically. As we can see, there is not a consensus regarding that question. For the moment, we may suggest the number of shootings depends on the lesion size and anatomical location. In addition, considering that the biggest height of the cutting section of the needle we have used for the current research is 2 cm, it is not recommend to use that needle in lesions smaller than this size, otherwise it would be very difficult to insert the needle in such lesions. Furthermore, if it is possible to shot the lesions more than once, this procedure should be done in different places of the lesion. In our study, there was not a standardization of the number of the specimens obtained. However, we have established a criteria to obtain at least there specimens from each lesion.

As far as the literature could be consulted, the cutting needle biopsy is an efficient, fast and safe method, which provides sufficient material for an accurate histological diagnosis [23] and it is widely used in the medicine as stated by Farias et al. [21], Lieberman et al. [22], Yu et al. [24] and Guimarães et al. [25]. However, in dentistry it is necessary to develop more studies to evaluate the effectiveness of this technique [9]. Additionally, Akan et al. [26] compared cutting needles of 14-, 16- and 18-gauge in rabbit's experimental studies, to verify the possible intraoperative complications caused by those needles; however, they did not find relevant results. In contrast, Yu et al. [24] found that hematoma occurred in patients who were submitted to cutting biopsy with needle with 18- and 20-gauge.

Two main limitations for the present study are related to the few samples analyzed and to the types of oral lesions which were biopsied, for instance, five fibrous inflammatory hyperplasia and two giant cells granulomas, one central and another one peripheral. Hence, we cannot affirm that the cutting needle biopsy technique could be used successfully in other types of

lesions, considering that the majority of the current cases were only inflammatory reactions. In addition, table 2 shows that the histological diagnosis of a central giant cell granuloma (CGCG) through the specimens obtained by the cutting needle biopsy has failed in both stages, before and after the knowledge of clinical history. Once again, this particular result confirms that there is an important limitation of this technique depending of the type of the oral lesion. In the same context, for some rare histological diagnosis the use of this technique could be also evaluated [27]. Moreover, in this study, only one examiner, specialist in oral pathology, has analyzed all slices. Thus, it is important to point out that the results of cutting needle biopsy in the histological diagnosis of oral lesions should be more robust with more examiners.

CONCLUSIONS

Considering the preliminary results of this pilot study, the use of cutting needle biopsy in the histological diagnosis of oral lesions should be analyzed carefully. Despite the promising results obtained with the knowledge of clinical history and the recommendation to take at least three shots in oral lesions, further studies including a large variability of these lesions in order to investigate the real potentiality of this technique in their histological diagnosis should be done.

ACKNOWLEDGMENTS AND DISCLOSURE STATEMENTS

The author reports no conflicts of interest related to this study.

REFERENCES

1. Hoffman WJ. New technic and instrument for obtaining biopsy specimens. Am J Cancer. 1931; 15:212-20.
2. Wan YL, Chan SC, Chen YL, Cheung YC, Lui KW, Wong HF, Hsueh C, See LC. Ultrasonography-guided core-needle biopsy of parotid gland masses. AJNR Am J Neuroradiol. 2004 Oct;25(9):1608-12. [Medline: 15502149] [FREE Full Text]
3. Cevik FC, Aykin N, Naz H. Complications and efficiency of liver biopsies using the Tru-Cut biopsy Gun. J Infect Dev Ctries. 2010 Mar 8;4(2):91-5. [Medline: 20212339] [FREE Full Text] [doi: 10.3855/jidc.572]
4. Screaton NJ, Berman LH, Grant JW. Head and neck lymphadenopathy: evaluation with US-guided cutting-needle biopsy. Radiology. 2002 Jul;224(1):75-81. [Medline: 12091664] [FREE Full Text] [doi: 10.1148/radiol.2241010602]
5. Yildirim E, Kirbas I, Harman A, Ozyer U, Tore HG, Aytekin C, Boyvat F. CT-guided cutting needle lung biopsy using modified coaxial technique: factors effecting risk of complications. Eur J Radiol. 2009 Apr;70(1):57-60. Epub 2008 [Medline: 18294798] [doi: 10.1016/j.ejrad.2008.01.006]
6. Yuan J, Li XH. Evaluation of pathological diagnosis using ultrasonography-guided lymph node core-needle biopsy. Chin Med J (Engl). 2010 Mar 20;123(6):690-4. [Medline: 20368088] [FREE Full Text]
7. Nicholson ML, Wheatley TJ, Doughman TM, White SA, Morgan JD, Veitch PS, Furness PN. A prospective randomized trial of three different sizes of core-cutting needle for renal transplant biopsy. Kidney Int. 2000 Jul;58(1):390-5. [Medline: 10886586] [doi: 10.1046/j.1523-1755.2000.00177.x]
8. Pfeiffer J, Ridder GJ. How safe is the use of ultrasound-guided cutting needle biopsy in the head and neck? Eur Radiol. 2010 Dec;20(12):2933-8. Epub 2010 Jun 30. [Medline: 20585783] [doi: 10.1007/s00330-010-1871-y]
9. Yamashita Y, Kurokawa H, Takeda S, Fukuyama H, Takahashi T. Preoperative histologic assessment of head and neck lesions using cutting needle biopsy. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2002 May;93(5):528-33. [Medline: 12075200] [doi: 10.1067/moe.2002.123867]
10. Southam JC, Bradley PF, Musgrove BT. Fine needle cutting biopsy of lesions of the head and neck. Br J Oral Maxillofac Surg. 1991 Aug;29(4):219-22. [Medline: 1911669] [doi: 10.1016/0266-4356(91)90187-A]
11. Ansarin M, De Fiori E, Preda L, Maffini F, Bruschini R, Calabrese L, Jereczek-Fossa BA, Chiesa F, Bellomi M. Ultrasound-guided transcutaneous Tru-Cut biopsy to diagnose laryngopharyngeal masses: a pilot study. Cancer. 2007 Jun 1;109(11):2268-72. [Medline: 17427170] [doi: 10.1002/cncr.22679]
12. Preda L, De Fiori E, Rampinelli C, Ansarin M, Petralia G, Maffini F, Alterio D, Bonello L, Chiesa F, Bellomi M. US-guided transcutaneous tru-cut biopsy of laryngo-hypopharyngeal lesions. Eur Radiol. 2010 Jun;20(6):1450-5. Epub 2009 Dec 17. [Medline: 20016904] [doi: 10.1007/s00330-009-1682-1]
13. Ridder GJ, Pfeiffer J. Usefulness of cutting needle biopsy in recurrent and advanced staged head and neck malignancies in a palliative setting. Support Care Cancer. 2007 Nov;15(11):1301-7. [Medline: 17375341] [doi: 10.1007/s00520-007-0237-8]
14. Lane JC. [Cutting-needle biopsy of the lung]. Rev Paul Med. 1975 Jan-Feb;85(1-2):18-22. Portuguese. [Medline: 1144991]

15. Kissin MW, Fisher C, Carter RL, Horton LW, Westbury G. Value of Tru-cut biopsy in the diagnosis of soft tissue tumours. Br J Surg. 1986 Sep;73(9):742-4. [Medline: 3756440] [doi: 10.1002/bjs.1800730921]
16. Scopa CD, Koukouras D, Spiliotis J, Harkoftakis J, Koureleas S, Kyriakopoulou D, Tzoracoleftherakis E. Comparison of fine needle aspiration and Tru-Cut biopsy of palpable mammary lesions. Cancer Detect Prev. 1996;20(6):620-4. [Medline: 8939348]
17. Jennings PE, Donald JJ, Coral A, Rode J, Lees WR. Ultrasound-guided core biopsy. Lancet. 1989 Jun 17;1(8651):1369-71. [Medline: 2567382] [doi: 10.1016/S0140-6736(89)92813-4]
18. Christopher DJ, Peter JV, Cherian AM. Blind pleural biopsy using a Tru-cut needle in moderate to large pleural effusion--an experience. Singapore Med J. 1998 May;39(5):196-9. [Medline: 9713223]
19. Bearcroft PW, Berman LH, Grant J. The use of ultrasound-guided cutting-needle biopsy in the neck. Clin Radiol. 1995 Oct;50(10):690-5. [Medline: 7586961] [doi: 10.1016/S0009-9260(05)83314-8]
20. Abreu-e-Lima MC, Maranhão N, Almeida V, Melo CB, Araújo E, Abreu-e-Lima M, Carvalho ARL. Comparação entre fragmentos obtidos com agulhas de calibres 14 e 12 em "core biopsy" estereotáxica de lesões mamárias impalpáveis: diferenças entre o tamanho dos fragmentos e freqüência dos tipos de lesões diagnosticadas. Radiol Bras. 2001; 34(5):255-60. [doi: 10.1590/S0100-39842001000500003]
21. de Farias AP, Deheinzelin D, Younes RN, Chojniak R. Computed tomography-guided biopsy of mediastinal lesions: fine versus cutting needles. Rev Hosp Clin Fac Med Sao Paulo. 2003 Mar-Apr;58(2):69-74. Epub 2003 Jun 25. [Medline: 12845358] [FREE Full Text] [doi: 10.1590/S0041-87812003000200003]
22. Lieberman S, Libson E, Maly B, Lebensart P, Ben-Yehuda D, Bloom AI. Imaging-guided percutaneous splenic biopsy using a 20- or 22-gauge cutting-edge core biopsy needle for the diagnosis of malignant lymphoma. AJR Am J Roentgenol. 2003 Oct;181(4):1025-7. [Medline: 14500223] [FREE Full Text]
23. Murphy JM, Gleeson FV, Flower CD. Percutaneous needle biopsy of the lung and its impact on patient management. World J Surg. 2001 Mar;25(3):373-9; discussion 379-80. Epub 2001 Apr 11. Review. [Medline: 11343197] [doi: 10.1007/s002680020388]
24. Yu LS, Deheinzelin D, Younes RN, Chojniak R. Computed tomography-guided cutting needle biopsy of pulmonary lesions. Rev Hosp Clin Fac Med Sao Paulo. 2002 Jan-Feb;57(1):15-8. [Medline: 12170344] [FREE Full Text]
25. Guimarães AC, Chapchap P, de Camargo B, Chojniak R. Computed tomography-guided needle biopsies in pediatric oncology. J Pediatr Surg. 2003 Jul;38(7):1066-8. [Medline: 12861541] [doi: 10.1016/S0022-3468(03)00194-5]
26. Akan H, Ozen N, Incesu L, Gümüş S, Güneş M. Are percutaneous transgastric biopsies using 14-, 16- and 18-G Tru-Cut needles safe? An experimental study in the rabbit. Australas Radiol. 1998 May;42(2):99-101. [Medline: 9599821] [doi: 10.1111/j.1440-1673.1998.tb00582.x]
27. Nikitakis NG, Tzerbos F, Triantafyllou K, Papadimas C, Sklavounou A. Granular Cell Ameloblastoma: an Unusual Histological Subtype Report and Review of Literature. J Oral Maxillofac Res 2010;1(4):e3. [URL: http://www.ejomr.org/JOMR/archives/2010/4/e3/v1n4e3ht.htm] [doi: 10.5037/jomr.2010.1403]

To cite this article:
dos Santos JA, Capella DL, Rozza RE, Ferreira SJ, Berti Couto SA, Sant'Ana Filho M, de Lima AA, Westphalen FH, Couto Souza PH. Histological Diagnosis of Oral Lesions with Cutting Needle Biopsy: a Pilot Study.
J Oral Maxillofac Res 2011;2(2):e3
URL: http://www.ejomr.org/JOMR/archives/2011/2/e3/v2n2e3ht.pdf
doi: 10.5037/jomr.2011.2203