



## Interest of Apical Palpation Test in Diagnosis of Acute Apical Abscess: Preliminary Study Regarding 74 Cases

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### Abstract

The validity of the apical palpation test in the diagnosis of acute apical abscess was evaluated on 74 patients attending the clinic of Conservative Dentistry of the Department of Odontology of Dakar. These patients had spontaneous acute pain, exacerbated by percussion and pulpal necrosis of the causal tooth. The intensity of spontaneous pain, pain after percussion and/or apical palpation was recorded. The causal tooth was then evaluated for the presence or absence of exudation. Any statistically significant difference has been demonstrated between the intensity of spontaneous pain, intensity of pain after percussion and the presence or absence of purulent exudate during endodontic drainage.

On the other hand, a significant relation was established between the intensity of the apical palpation pain and the presence or absence of purulent exudate during this drainage ( $P = 0.005$ ). The analysis of the results regarding the intensity of palpation pain allows to confirm the diagnosis of acute apical abscess in 76.67 % of palpation with intense pain and in 60.87 % of palpation with moderated pain.

Thus, this test was considered as being an acceptable diagnostic criterion of the acute apical abscess.

**Keywords:** Diagnostic Criteria; Apical Palpation Test; Acute Apical Abscess; Acute Apical Periodontitis

### Introduction

Pulpal or periodontal disease is characterized by semiology which gives to the practitioner signs or symptoms for diagnosis. The diagnosis is the prerequisite for any emergency or routine intervention in order to adopt the correct therapeutic attitude and to respect the rule of "premium non nocere" [1].

Acute pulpal and periodontal diseases of pulp origin as the irreversible acute pulpitis, acute apical periodontitis or acute apical abscess are usually the individualization of three different stages of the same physiopathological mechanism [2,3]. Similarly, the etiology and treatment of these three diseases are the same. Only emergency treatment justified to distinguish them. Thus the differential diagnosis of acute apical periodontitis and non-suppurated acute apical abscess must be performed before any operative procedures [4]. Indeed the interest to differentiate these two groups is the requirement during the emergency treatment, to obtain a periapical evacuation of pus in acute apical abscess [5]. This evacuation can be done while of the pulp chamber opened but can sometimes require transfixion of apical foramen. Diagnosis of acute apical abscess should be clearly established when there is no swelling. It is based on the diagnostic criteria whose presence is necessary and sufficient to establish a diagnosis. Diagnosis criteria of acute apical periodontitis would be the existence of a bacterial pathway of contamination of endodontic origin, the negative response to pulp sensitivity tests, spontaneous pain and pain exacerbated by percussion and the absence of pain at apical palpation [1].

Regarding acute apical abscess, criteria differ only by the presence of pain at apical palpation or the presence of a

submucosal or subperiosteal swelling [6]. These criteria have been proposed and accepted in the literature but few have been validated by clinical studies [7,8]. So the criterion pain at apical palpation which would be the only one to distinguish acute apical periodontitis from acute apical abscess in case of absence of swelling has never been evaluated or validated. This clinical study was to evaluate the relationship between a positive response to the apical palpation test and the presence of purulent collection in acute apical abscess in his endodontic evacuation expression.

## Material and Method

Our study was conducted on 74 patients attending Conservative Dentistry clinic of Odontology Department of University Cheikh Anta Diop of Dakar, from December 2013 to September 2014. All patients were examined by two practitioners specialist in Endodontics. The inclusion of subjects in the study was based on three criteria that were: i) presence of spontaneous pain, ii) pain exacerbation with percussion or pressure of causal tooth and iii) the pulp necrosis of the causal tooth.

Exclusion criteria for the study were the presence of swelling, oedema, and/or gingival inflammation. Indeed, these signs were considered either to be pathognomonic of acute apical abscess or to be confused with periodontal disease. The intensity of spontaneous pain and response to percussion of the tooth were quantified by a verbal numeric rating scale (VNS) with 4 levels: low, moderate, intense, and extremely intense. The percussion test was performed, dropping vertically from a height of 5 mm, the sleeve of a mirror on the occlusal surface, starting with the contralateral teeth and adjacent to the infected tooth.

Depending on symptomatology, pulp necrosis was established if no response to sensitivity test was recorded. This test was performed by applying a cooling spray (Pharmaéthyl<sup>®</sup>, Laboratoires Septodont, France) in the cervical third of the dried labial surface of the crown, always starting with a sound tooth used as control. The apical palpation test was performed by pressure from the pulp of the index on the buccal side of the alveolar process of the causal tooth, in search of pain point. This test always began from the contralateral and adjacent areas of the infected tooth used as controls. Digital pressure was applied with maximum force as it did not induce painful response in the control teeth. The response was quantified by a verbal numeric rating scale (VNS) with five levels: no pain, low pain, moderate, intense or very intense. The tooth was then trepaned with a tungsten carbide round bur No. 12 (Maillefer Instruments Ballaigues, Switzerland) mounted on turbine. Then, the presence of a purulent exudate and / or blood and / or serous or absence of exudation can be assessed visually. In this latter case, an endodontic access cavity was realized with a EndoZ bur (Maillefer Instruments, Ballaigues, Switzerland) mounted on turbine followed by introduction of paper points into the root canal in order to highlight an eventual exudate.

In case of absence of spontaneous drainage of exudate in pulp chamber or in root canal associated with a low to extremely intense pain at apical palpation, a transfixion of the foramen was performed using respectively K-files: #10, #15, and #20 in order to evacuate a possible purulent collection of peri-apex. As for cavity access, the transfixion could lead to purulent exudate and/or blood and/or serous or no exudate. Only the presence of purulent exudate and blood, purulent and serous exudate was considered as external standard reference, contrary to the presence of blood or serous exudate. The sensitivity was determined by the positive response to the apical palpation test due to inflammation of the peri-apex.

## Results

In total, 29 male and 45 female were examined, aged between 15 to 48 years. The average age is 25 years with a standard deviation of 7 years. The most representative group is 21-30 years (Table 1).

Age	Number	Percentage (%)
15-20	24	32,4
21-30	34	45,9
31-40	13	17,6
41-50	3	4,1
Total	74	100

**Table 1:** Population distribution by age and percentage

The analysis of the results regarding the intensity of palpation pain allows to confirm the diagnosis of acute apical abscess in 76.67 % of palpation with intense pain and in 60.87 % of palpation with moderated pain (Table 2).

Spontaneous pain	Absence of pus	Presence of pus	Number of teeth
Low	2 (40%)	3 (60%)	5
Moderate	9 (39,15%)	14 (60,87%)	23
Intense	7 (23,33%)	23 (76,67%)	30
Extremely intense	3 (100%)		3
<b>Total</b>	21	40	61

**Table 2:** Distribution of the intensity of spontaneous pain in relation with presence or absence of purulent exudate after evacuation and percentage of the total

Relationship between intensity of apical palpation pain and presence or absence of purulent exudate is significant (P= 0.5%) (Table 3). Among the 61 teeth with pain at apical palpation, 20 are located at upper maxillary and 41 at mandible. Distribution is presented in Table 4.

	Blood	Serosity	Pus	Dry	Total
Positive	17	4	40	0	61
Negative	6	1	4	2	13
Total	23	5	44	2	74

*p-value = 0,5%*

**Table 3:** Distribution of pain intensity in response to palpation test in relation with presence or absence of purulent exudate after evacuation and percentage of the total

	Blood	Serosity	Pus	Total
Mandible	12	1	28	41
Maxillary	5	3	12	20
Total	17	4	40	61

*p-value = 17,7%*

**Table 4:** Teeth distribution according to the maxillaries

The nature of apical content is presented in Table 5 for maxillary and Table 6 for mandible. Mostly, response to maxillary or mandibular palpation is moderate or intense.

	Blood	Serosity	Pus	Total
Low	0	0	1	1
Moderate	3	1	5	9
Intense	1	2	6	9
Extremely intense	1	0	0	1
Total	5	3	12	20

*p-value = 53%*

**Table 5:** Nature of the apical content according to the intensity of the response to the maxillary positive palpation and percentage of the total

	Blood	Serosity	Pus	Total
Low	2	0	2	4
Moderate	5	0	9	14
Intense	4	0	17	21
Extremely intense	1	1	0	2
Total	12	1	28	41

*p-value = 0,1%*

**Table 6:** Nature of the apical content according to the intensity of the response to the mandibular positive palpation and percentage of the total

The results recorded do not suggest a greater tendency of maxillary or mandible to develop an acute apical abscess (P=0.53). As negative response at apical palpation (no pain), we have recorded the following results regarding 13 teeth: 6 teeth (46.15%) presented a blood exsudate, 1 tooth (7.69%) a serous exsudate, 4 teeth (30.77%) a purulent exsudate and 2 teeth (15.39%) without any exudate.

## Discussion

Several clinical studies [9-11] were conducted to validate various diagnostic tests in cariology but, to our knowledge, few studies of the diagnosis criteria of pulpal and periodontal diseases are available [3,9,12]. The external standard

reference was the presence or absence of pus and was established by visual assessment of the nature of the exudate without any anatomopathological or microbiological analysis. Indeed, by definition, pus is a fluid resulting from inflammation, consisting in serous fluid septic or not, with color, consistency and odor depending on germ implicated.

This purulent exudate could therefore easily be visually distinguished from purely serous exudates and / or blood whose presence excludes the diagnosis of acute apical abscess. Pain at apical palpation was appreciated by patients only by mean of a verbal numeric rating scale (VNS). The variability of that assessment could probably be minimized by use of a visual analog scale (VAS). However, the use of verbal numeric rating scale (VNS) in this study as a method for evaluation of the severity of pain is acceptable, especially since it is easy to use for practitioners. The reproducibility of the test, intra- and inter-examine has not been evaluated. Intra examiner reliability could not be verified because the studied diseases in this work are progressive diseases which not permit to reproduce the same conditions at different times [13]. Another study would be useful to evaluate the reliability inter examiner. The studied sample seemed representative of the type of patient attending the clinic of Conservative Dentistry of Odontology Department of Dakar. The most represented age group (nearly 46 % of subjects) was that of 21-30 years corresponding to a period of life when oral health is not necessarily a priority.

The sample size of the study was questionable and can justify the necessity of another study with a larger number of patients and with multiple examiners in order to confirm the validity of this test. However, this work had the benefit of being a preliminary study seeking for assessment of the diagnostic criteria. In the literature [6, 14-17], the acute apical abscess is often characterized, by a major pain to percussion, high mobility of the tooth and spontaneous pain. However, these criteria do not allow a differential diagnosis between acute apical periodontitis and acute apical abscess. Indeed, this study showed no significant difference regarding spontaneous pain or percussion between the two conditions.

In the positive response to palpation, we can note that of the 74 teeth examined, 61 gave a positive response (82.44%) and 13 (17.56%) gave a negative one.

The first indication of this study is that the positive response to apical palpation is a good indicator of the progression of acute inflammation because it reveals an inflammatory condition which has sufficiently reached alveolar bone to be detectable on palpation. In fact, for several authors [6,18-20] the sensitivity at apical palpation consists in an inflammation of the peri apex. Seventeen teeth (27.87%) had a blood exudate, 4 teeth (6.56%) a serous exudate and 40 teeth (65.57%) a purulent exudate. We did not encounter cases where the positive response to palpation is associated with a canal without exudate (dry). This allows supposing the link between a positive response to palpation and the existence of an exudate in the apical region without any information on the nature of the exudate.

Regarding the nature of the exudate, our results showed that in 2/3 of cases, the exudate is purulent. Thus, we can deduce that when apical palpation is positive, in 2/3 of cases, there is an acute apical abscess and in 1/3 of cases an acute apical periodontitis. Analysis of the results taking into account the intensity of pain at palpation can confirm the diagnosis of acute apical abscess in 76.67 % of cases if the pain on palpation is intense and 62.87 % cases if the pain is moderate.

With negative response to palpation, we recorded that among 13 teeth, 6 (46.15 %) presented a blood exudate, 1 (7.69%) a serous exudate, 4 (30.77 %) a purulent exudate and 2 (15.39%) showed no exudate. Although the number of cases does not allow drawing conclusions, the trend is as follow: when apical palpation is negative, the diagnosis of apical periodontitis is expected to 70 % and the diagnosis of acute apical abscess to 30%. It seems that the validity of the diagnostic test "apical palpation pain" which permits to establish the differential diagnosis between acute apical periodontitis and acute apical abscess without swelling is acceptable. This test also has the advantage of being fast, easily applicable in clinical practice, and has a negligible cost because any special instrumentation is required.

## Conclusion

Acute apical abscess is a periapical disease characterized by pulp necrosis. The presence of pus in the apical region associated with severe symptoms explains the need for an urgent endodontic therapy. Currently, the diagnosis is confirmed only after the completion of the access cavity and evacuation. Our study showed a significant relationship between a positive response to the apical palpation test and presence of pus in the diagnosis of acute apical abscess. However the quality of the test can be improved by the quantification of the pain.

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