



## Advocacy White Paper on Evidence Based Third Molar Surgery

The American Association of Oral and Maxillofacial Surgeons (AAOMS) is an advocate for the practice of evidence based medicine and dentistry. AAOMS strongly recommends that when considering treatment for patients, the oral and maxillofacial surgeon must apply pertinent available scientific data to each individual case, critically weigh treatment options, and choose a course of action that best fits the needs of the patient, while being mindful of the financial impact to the patient as well as the cost to society. The management of third molar teeth is a complex topic: appropriate treatment options include removal, partial removal (coronectomy), or retention with subsequent clinical and radiographic surveillance and hygiene maintenance.

There is generalized agreement in the medical and dental profession that the removal of third molar teeth is always appropriate when there is evidence of pathological changes such as periodontal disease, non-restorable carious lesions, infections, cysts, tumors, and damage to adjacent teeth. There is also generalized agreement that third molar teeth that are completely erupted and functional, painless, free of caries, in hygienic position with a healthy periodontium, without other associated pathologic conditions, are disease-free teeth that may not require extraction, but do require hygiene maintenance and periodic clinical and radiographic surveillance if retained.

The medical necessity for removal of erupted, partially (or visible) impacted, and fully impacted third molar teeth have been recently challenged by some political action groups and third party carriers. The controversy regarding the medical necessity for removal of third molar teeth seems to be centered on the usage of the term “asymptomatic” in describing the condition of the third molar teeth, or when the extraction of said teeth is described as “prophylactic”.

The term “asymptomatic” has been used by some to describe the condition of erupted, impacted, or partially impacted third molar teeth. The word “asymptomatic” is an adjective that indicates the noun to which it refers (in this case the third molars) is neither causing nor exhibiting *symptoms* of disease. This word does not indicate that there is no disease—just that there are no symptoms. However, there is a significant difference between “disease free” as described above, and “asymptomatic”.

Beginning almost fifty years ago, studies have documented the presence of periodontal disease around asymptomatic third molars.<sup>1</sup> Two very large epidemiological studies show an association between third molar teeth and periodontal pathology in both younger and older patient populations.<sup>2 3</sup> Recently, the findings of a large scale, multidisciplinary, multiple site, prospective, longitudinal study have shown that

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<sup>1</sup> Ash M, Costich ER, Hayward JR: A study of periodontal hazards of third molars. *Journal of Periodontology* 1962;33:209

<sup>2</sup> Elter JR, Coumo CJ, Offenbacher S, et.al. Third molars associated with periodontal pathology in NHANES III. *Journal of Oral and Maxillofacial Surgery*, 2004; 62:440

<sup>3</sup> Elter JR, Offenbacher S, White RP, et.al. Third molars associated with periodontal pathology in older Americans. *Journal of Oral and Maxillofacial Surgery*, 2005; 63:179

a significant number—almost 25% of patients with retained asymptomatic third molar teeth had baseline probing depths of 5mm or greater on the distal of a second molar or around a third molar tooth. If the probing depth in this area was equal to or greater than 5mm, then there was also an associated attachment loss of greater than 2 mm in 80/82 patients. The same study reported that a higher proportion of patients with the probing depths equal to or greater than 5 mm were more than 25 years old.<sup>4</sup> Another study showed that for 38% patients with probing depths of greater than or equal to 4mm in the second/third molar region upon enrollment in the study, the probing depths increased in a relatively short period of time with a mean follow up of 2.2 years. The study also concluded that contrary to the expectations of the public and clinicians, erupted third molar teeth are as likely to have increases in probing depths as impacted third molars.<sup>5</sup> These studies and others show that patients with erupted and impacted third molar teeth that have no symptoms associated with their third molars may actually have active inflammatory periodontal disease.

Research has also related the presence of wisdom teeth to the progression of periodontal disease.<sup>6</sup> Numerous dental research efforts have studied the microbial make-up of biofilm in plaque and the respondent mediators of inflammation that cause periodontal disease, and the relationship of these factors to other systemic diseases. Biofilms form when free floating bacteria attach to surfaces, produce an extracellular matrix which serves to trap nutrients from its surrounding environment, and to allow cohesion of clumps of microbes.<sup>7</sup> The transfer of genetic and signaling information among the microbes within biofilms leads to resistance of the microbial population to antibacterial agents.<sup>8</sup> There is mounting evidence that biofilms are the causative agents of many infections in humans,<sup>9</sup> including periodontitis and chronic lung infections on cystic fibrosis patients, infections of indwelling medical devices, odontogenic infections and bisphosphonate related osteomyelitis of the jaws.<sup>10 11</sup> The infections share common characteristics; the bacteria in biofilms invade the host defenses, withstand antimicrobial therapy, and persist until the colonized surface is surgically removed from the body.<sup>12</sup>

White studied the microbial complexes found in the subgingival plaque in periodontal pockets of 5 mm or greater around third molars and found that organisms responsible for the initiation and propagation of periodontal disease were present, including *Bacteroides forsythus*, *Prevotella gingivalis*, *Treponema denticola*, *Prevotella intermedia* and *Campylobacter rectus*.<sup>13</sup> These, and other bacteria have been

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<sup>4</sup> Blakey GH, Marciani RD, Haug RH, et.al: Periodontal pathology associated with asymptomatic third molars; Journal of Oral and Maxillofacial Surgery. 2001;60:1227-1233

<sup>5</sup> Blakey GH, Jacks MT, Offenbacher S, et.al. : Progression of periodontal disease in the second/third molar region in subjects with asymptomatic third molars. Journal of Oral and Maxillofacial Surgery; 2006; 64:189-193

<sup>6</sup> White RP, Offenbacher S, Blakey, et.al: Chronic Oral inflammation and the progression of periodontal pathology in the third molar region. Journal of Oral and maxillofacial Surgery 2006; 64: 880

<sup>7</sup> RayMJ, Triplett RG. What is the role of biofilms in severe head and neck infections? Oral and Maxillofacial Clinics of North America 2011; 23:497-505

<sup>8</sup> RayMJ, Triplett RG. What is the role of biofilms in severe head and neck infections? Oral and Maxillofacial clinics of North America 2011; 23:497-505

<sup>9</sup> Stewart PS, Costerton JW: Antibiotic resistance of bacteria in biofilms. Lancet 2001;358:135

<sup>10</sup> Stewart PS, Costerton JW: Antibiotic resistance of bacteria in biofilms. Lancet 2001;358:135

<sup>11</sup> Sedghizadeh pp, Kumar SKS, Gorur A, et.al. : Identification of microbial biofilms in osteonecrosis of the jaws secondary to bisphosphonate therapy. Journal of Oral and Maxillofacial Surgery 2008; 66:767-775

<sup>12</sup> Stewart PS, Costerton JW: Antibiotic resistance of bacteria in biofilms. Lancet 2001;358:135

<sup>13</sup> White RP, Madianos PN, Offenbacher S.: Microbial complexes detected in the second/third molar region in patients with asymptomatic third molars. Journal of Oral and Maxillofacial Surgery 2002; 60:1234-1240

shown to work in clusters as the causative agents for the initiation and propagation of periodontitis.<sup>14</sup> The gingival crevicular fluid in pockets around third molar teeth, even in pockets shallower than 5mm, has been shown to harbor inflammatory mediators.<sup>15</sup> These inflammatory mediators have been shown to increase systemic health risks such as cardiovascular disease<sup>16 17 18</sup>, non-hemorrhagic stroke<sup>19</sup>, preterm low birth weight pregnancies<sup>20</sup> and kidney disease.<sup>21</sup>

There is supporting evidence that once periodontal disease or pericoronal disease is established in the third molar areas, the problem is persistent and progressive,<sup>22</sup> but may improve following extraction of the teeth. Plaque and gingival indices, two accepted criteria for determining the status of oral and gingival health, have been shown to be increased in teeth adjacent partially impacted third molars.<sup>23 24</sup> Giglio et.al. reported improvement in plaque and gingival index scores in impacted teeth with symptoms and without symptoms following extractions.<sup>25</sup> Pericoronal infections related to ectopically erupted, partially erupted and impacted third molar teeth are common complaints causing persons to seek care from oral and maxillofacial surgeons. The presence of a symptomatic or asymptomatic pericoronal infection is, of course an absolute indication for removal of the third molar teeth.

Periodontal pocketing, elevated plaque and gingival indices, the presence of pericoronal infection are all indications that disease exists related to third molar teeth. Extraction of third molar teeth after the age of 25 is itself a risk factor for incomplete healing and the need for additional treatment.<sup>26</sup> This new, relevant research supports the surgical intervention or removal of third molar teeth prior to the development of periodontal pathology, when the post-surgical healing is optimal, and the risk of post-

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<sup>14</sup> Socransk SS, Haffajee AD, Cugini MA, et.al. : Microbial complexes detected in subgingival plaque. *Journal of Clinical Periodontology* 1998;25:134

<sup>15</sup> White RP, Offenbachers, Phillips C, et.al: Inflammatory mediators and periodontitis in patients with asymptomatic third molars. *Journal of Oral and Maxillofacial Surgery* 2001; 60:1241

<sup>16</sup> Slade G, Ghezzi EM, Heiss G, et.al: Relationship between periodontal disease and C-reactive protein among adults in the atherosclerosis risk in communities study. *Archives of Internal Medicine* 2003;163:1172-1179

<sup>17</sup> Elter JR, Champagne CM, Offenbachers, et.al: Relationship of periodontal disease and tooth loss to prevalence of coronary disease. *Journal of Periodontology* 2004; 75:782-790

<sup>18</sup> Spahr A, Klein E, Khuseyinova N, et.al: Periodontal infections and Coronary Heart Disease. *Archives of Internal Medicine* 2006; 166:554-559

<sup>19</sup> Wu T, Trevisan M Genco R et.al. Periodontal Disease and risk of cerebrovascular disease: The first National Health and Nutrition Examination Survey and its follow-up study. *Archives of Internal Medicine* 2000; 160:2749-2755.

<sup>20</sup> Offenbacher S, Katz V, Fertig G, et.al: Periodontal infection as a possible risk factor for preterm low birth weight. *Journal of Periodontology* 1996 (supplement 10)67:1103

<sup>21</sup> Kshirsagar A, Moss KL, Elter JR, et.al. Periodontal disease is associated with renal insufficiency in the Atherosclerosis Risk in Communities (ARIC) study. *American Journal of Kidney Disease* 2005; 45:650-657

<sup>22 23</sup> White RP, Offenbacher S, Blakey, et.al: Chronic oral inflammation and the progression of periodontal pathology in the third molar region. *Journal of Oral and maxillofacial Surgery* 2006; 64: 880

<sup>23</sup> Ylipaavalniemi P, Turtola L, Rytomaa I. et al: Effect of position of wisdom teeth on the plaque index and gingival bleeding index. *Proc Finn Dent Soc* 78:47, 1982

<sup>24</sup> Giglio JA, Gunsolley, Laskin DM, et.al: Effect of removing third molars on plaque and gingival indices. *Journal of Oral and maxillofacial Surgery* 1994; 52:584-587

<sup>25</sup> Giglio JA, Gunsolley, Laskin DM, et.al: Effect of removing third molars on plaque and gingival indices. *Journal of Oral and maxillofacial Surgery* 1994; 52:584-587

<sup>26</sup> Kugelberg CF, Ahlstrom U, Ericson S, et.al: The influence of anatomical, pathophysiological, and other factors on periodontal healing after impacted third molar surgery: A multiple regression analysis. *Journal of Clinical Periodontology*. 1991; 16:37-

operative complications is lowest. AAOMS fully supports the elective, therapeutic removal of impacted third molar teeth that are not likely to erupt into a disease free position, whether the third molar teeth exhibit symptoms or not, and preferably prior to the onset of periodontal or pericoronal disease.

There are other conditions that may not cause pain or other symptoms, such as when an impacted or partially impacted third molar tooth is positioned ectopically and prevents the eruption of an adjacent tooth, or causes damage to the adjacent tooth. Occult cystic disease was found to be present in about one third of impacted third molars in one study.<sup>27</sup> Histopathological examination of radiographically normal appearing follicles of impacted third molar teeth demonstrated the presence of cystic changes in up to 50% of patients older than 20 years old.<sup>28</sup> Another study reported that 42% of dentigerous cysts associated with impacted third molar teeth were asymptomatic. The researcher offered that the presence of symptoms alone is a poor indicator of the presence of dentigerous cysts associated with impacted third molar teeth.<sup>29</sup> In these cases, the third molar tooth may be asymptomatic, but the overall condition is not “disease free”. Elective therapeutic extraction of the third molar tooth in may be required in order to maintain a disease free oral environment.

The term, “prophylactic”, by definition, indicates that a disease free state already exists, and that a course of action such as a medication or a surgical procedure is being utilized to prevent a disease from occurring. In some instances, disease free teeth with no symptoms require extraction to prevent pathology from developing as a result of the presence, location or condition of the third molar teeth. For example, the teeth may require removal for orthodontic purposes, or in preparation for orthognathic surgery. There may not be adequate predicted jaw length to accommodate the third molar teeth.<sup>30 31 32</sup> However, jaw growth and the eruption patterns of third molar teeth are not entirely predictable.<sup>33 34</sup> The third molar tooth has been shown to continue to change in position over time within the mandible<sup>35</sup>, generally to a less favorable position with respect to the difficulty in extraction and risk of intraoperative complications. The state of root development must also be considered, as the incidence of nerve injuries is statistically related to the age of the patient. A higher incidence of nerve injury in older patients has been attributed to more fully developed third molar teeth and third molar teeth with roots in proximity to the inferior alveolar nerve, decrease nerve regeneration or neuronal plasticity in

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<sup>27</sup> Glosser JW, Campbell JH: Pathologic change in soft tissues associated with radiographically “normal” third molar impactions. *British Journal of Oral and Maxillofacial Surgery*, 1999; 37: 259-260

<sup>28</sup> Baykul T, Saglamm AA, Ulkem, A, et.al.: Incidence of cystic changes in radiographically normal impacted lower third molar follicles. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics*. 2005; 99:542-545

<sup>29</sup> Campbell JH: Third molar symptoms are not Indicative of dentigerous cysts. *Journal of Oral and Maxillofacial Surgery Supplement*, 2005. 63:38

<sup>30</sup> Venta I, Murtomaa H, Ylipaavalniemi P, A device to predict lower third molar eruption. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics* 1997; 84:598

<sup>31</sup> Venta I, Schou S: Accuracy of third molar eruption predictor in predicting eruption. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontics* 2001; 91:638-642

<sup>32</sup> Hattahb FH, Abu Alhaija ESJ: Radiographic evaluation of mandibular third molar eruption. *Oral Surgery, Oral Medicine, Oral Pathology Oral Radiology and Endodontics* 1999;88:285-291

<sup>33</sup> Kahl B, Gerlach KL, Hilgers RD. A long –term follow-up, radiographic examination of asymptomatic impacted third molars in orthodontically treated patients, *International Journal of Oral and Maxillofacial Surgery*, 1994; 23:279-285

<sup>34</sup> Sandhu S, Kaur T. Radiographic study of the positional changes and eruption of impacted third molars in young adults of an Asian Indian population. *Journal of Oral and Maxillofacial Surgery* 2008; 66:1617-1624

<sup>35</sup> Venta I, Ylipaavalniemi P, Tortola L. Clinical outcome of third molars in adults followed during 18 years. *Journal of Oral and Maxillofacial Surgery* 2004; 62:182

older patients.<sup>36 37</sup> For these and other patients, removal of third molar teeth is the best treatment option.

The morbidity associated with surgical management of third molar teeth, as well as the risk of complications has been shown to increase with increasing age.<sup>38 39 40</sup> Although the frequency is not high, the complications of odontogenic cysts and tumors, damage to adjacent teeth, and dental crowding, and changes in position of adjacent teeth may be prevented by extraction of third molar teeth earlier.<sup>41</sup> The literature is replete with case reports of severe multi-fascial space head and neck infections, necrotizing fasciitis, osteomyelitis, and death occurring when third molar teeth that have not erupted into functional, disease free position are maintained and become infected. Management of these conditions is especially challenging in the older population. This is poignantly described in an editorial article by Dr. Leon Asseal, then editor of the *Journal of Oral and Maxillofacial Surgery*, where he presents a radiograph of a patient with bilateral impacted mandibular third molar teeth with large, bilateral dentigerous cysts and osteomyelitis. He reports that this is the radiograph a patient who is “60 years old, had taken bisphosphonates, had undergone chemotherapy, aortic, and mitral valve replacements”. She presented with acute cellulitis. Days of hospitalization, surgery, and rehabilitation were necessary to restore her health”.<sup>42</sup>

In 2008, the American Public Health Association (APHA) adopted a policy in opposition to “prophylactic” removal of wisdom teeth.<sup>43</sup> This policy seems to be based on unscientific extrapolation of data. The scientific literature referenced in this document and elsewhere does indeed support the elective removal of wisdom teeth in cases where pathology is likely to occur as a result of retaining the third molar teeth. AAOMS is an advocate for access to care for patients on all fronts. AAOMS is circumspect about any policy statement such as the APHA policy that could possibly limit a patient’s access to information regarding the nature of any current or potential pathologic conditions they may have, and choice of treatment options available to them.

In closing, it is apparent that treatment considerations involving the decision regarding the why, when or how to treat third molar teeth are extremely complex. There is no pat answer, cookbook recipe, or flow chart that is universally accepted regarding the decision making process. The presence of the third molar teeth, their position within the jaws and or dental arches, the condition of the teeth and associated teeth and structures, the presence or potential for pathology associated with the third molar

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<sup>36</sup> Queral-Gody E, Valmaseda-Castellon E, Berini-Aytes L, et.al, Incidence and evolution of inferior alveolar nerve lesions following lower third molar extractions. *Oral Surgery, Oral medicine, Oral Pathology, Oral Radiology and Endodontics* 2005 99:259-264.

<sup>37</sup> Valmaseda-Castellon E, Berini-Aytes L, Gay-Escoda C. Inferior alveolar nerve damage following lower third molar extractions: A prospective study of 1117 extractions. *Oral Surgery, oral medicine, Oral pathology, Oral Radiology and Endodontics* 2001 92:377-383

<sup>38</sup> Bui CH, Selodin EB, Dodson TB: Types, frequencies and risk factors for complications after third molar extraction. *Journal of Oral and Maxillofacial Surgery.* 2003; 61:1379.

<sup>39</sup> Bouloux GF, Steed MB, and Perciaccante VJ: Complications of third molar surgery. *Oral and Maxillofacial Surgery Clinics of North America* 2007; 19:117-128

<sup>40</sup> Marciani RD: Third molar removal: An overview of indications, imaging, evaluation, and assessment of risk. *Oral and Maxillofacial Surgery Clinics of North America.* 2007; 19:1-13

<sup>41</sup> Salgaam AA, Tuzum MS: Clinical and Radiologic investigation of the incidence, complications, and suitable removal times for fully impacted teeth in the Turkish population. *Quintessence International* 2003; 34:53-59

<sup>42</sup> Asseal L.: Indications for elective therapeutic third molar removal: The evidence is in. *Journal of Oral and Maxillofacial Surgery;* 2005 63:1691-1692

teeth must be considered carefully. The risks of complications involved with early treatment of third molar teeth that are likely to cause problems versus the morbidity caused by retained third molar teeth and subsequent treatment in an older patient must be weighed. The OMS practitioner must attempt, as much as is possible to base clinical decisions on scientific evidence that there is a pathologic condition that exists, or is likely to develop, and that the proposed treatment will ameliorate, or prevent the condition. The care provided must be predictably effective in producing the desired outcome. AAOMS firmly supports the surgical management of erupted and impacted third molar teeth, even if the teeth are asymptomatic, if there is presence or reasonable potential that pathology may occur caused by or related to the third molar teeth

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