Oxidized Cellulose Foam in Prevention of Alveolar Osteitis

Dr Amiya Agrawal¹, Dr Neeraj Singh², Dr Ankita Singhal³

¹(Senior Lecturer, Dept. of Oral & Maxillofacial Surgery, Purvanchal Institute of Dental Sciences, Gorakhpur, India)
²(Professor & Head, Dept. of Oral & Maxillofacial Surgery, Purvanchal Institute of Dental Sciences, Gorakhpur, India)
³(Consultant Oro-dental Surgeon, Faculty of Dental Sciences, King George’s Medical University, Lucknow, India)

Abstract: In achieving hemostasis in 40 out of 208 cases of third molar extraction in Dept. of Oral & Maxillofacial Surgery, Purvanchal Institute of Dental Sciences, Gorakhpur UP, Oxidized cellulose foam (OCF) was used. The incidence of Alveolar Osteitis (AO) in OCF treated sockets was found to be 5% (2/40) which was significantly lower than the non-OCF treated sockets 12% (20/168). The use of Oxidized cellulose (OCF) was found to be associated with decreased incidence of Alveolar Osteitis in mandibular third molar extraction cases.

Key Words: Alveolar Osteitis, Extraction, Mandibular Third Molar, Oxidized Cellulos Foam.

I. Introduction

The term Alveolar Osteitis (AO) or Dry Socket is attributed to an American dentist James Young Crawford and is one of the most frequent complications that happened after dental extraction. It is especially prevalent after mandibular third molar extraction. There is intense pain in the extraction zone commencing at any time between the first and fourth day post extraction accompanied by a partial or total disintegration and loss of blood clot from the alveolar socket. Various names are used for this painful post-operative condition such as localized osteomyelitis, acute alveolitis, and alveolitis sicca dolorosa etc.

The overall incidence of AO post dental extraction ranges from 2-5%. This is increased to 20-30% for mandibular third molar extraction. The peak age was 20-40 years, with increased incidence among females. Fibrinolysis with subsequent loss of blood clot is believed to be the general cause, with a primary role of bacteria in this process has been reported (Birn’s Hypothesis).

No clear etiology has been acknowledged; however, numerous risk factors have been proposed and tested. Multivariate analysis revealed operator experience, perioperative crown and root fractures, periodontal disease, posterior teeth, and, interestingly, the use of mental health medications to be significant independent risk factors for the development of alveolar osteitis. Other factors that have been implicated including frequent changing of pressure dressing gauze, frequent mouth rinsing, underlying infection, smoking, surgical trauma, & excessive amounts of local anaesthetics. No alveolar osteitis was reported in patients taking antibiotics, the oral contraceptive pill, bisphosphonates, or oral steroid drugs.

Several methods have been used time to time to reduce the incidence of Alveolar Osteitis. These include the use of chlorohexidine mouthwashes, the placement of medicated packing into the extraction sockets, and the prophylactic use of antimicrobials.

Oxidized cellulose foam (OCF) is a haemostatic packing agent that accelerates the clotting by various mechanisms. The material, when soaked with blood, swells to form a gelatinous mass that plugs the bleeding site, it also causes 1. Rapid formation of platelet plug by surface interactions with proteins and platelets, 2. Activation of extrinsic and intrinsic pathways of clotting cascade and hence stops bleeding. OCF is one of the most commonly used bioabsorbable topical haemostatic agents used in general surgery. In periodontal surgery it was found to enhance healing.

OCF is frequently used in oral surgery practice and the indication of use is when there is bleeding that cannot be controlled by simple packing measures and suturing.

In the Department of Oral and Maxillofacial Surgery, Purvanchal Institute of Dental Sciences, Gorakhpur UP, it was noticed that none of the 126 patients who underwent chair side third molar extraction under local anaesthesia between the periods of July 2009 to February 2010 reported Alveolar Osteitis. The records of these patients showed that in many cases OCF was placed in the tooth socket following tooth extraction to enhance & achieve haemostasis. It was therefore decided to investigate the relationship between the occurrence of AO among these patients who had their third molar extracted surgically and the use of OCF.
II. Methods
This study comprised of 172 patients having mandibular third molars- erupted, impacted or partially impacted, attending out-patient department of Oral & Maxillofacial Surgery of Purvanchal Institute of Dental Sciences, Gorakhpur UP between the period February 2010 to December 2010. The patients were taken up randomly irrespective of age, sex, caste & creed.

Exclusion criteria- Patients with debilitating diseases, uncontrolled diabetes, acute infections; Pericoronitis, periapical pathosis associated with third molar were excluded from the study (however although carious third molars without periapical pathosis and third molars with treated pericoronitis were included). Informed consent was taken to participate in the study preoperatively. Detailed & relevant medical/dental history was recorded. Routine investigations were carried out like complete hemogram with glycemic index & viral marker screening for HIV, Australian Antigen & HCV.

One person (an oral and maxillofacial surgeon) performed all the surgical procedures. A full thickness trapezoidal mucoperiosteal flap was raised using standard Ward’s incision and a posterior relieving incision. The bone around the tooth was osteotomized using high torque low speed electrical drill using carbide bur of nos under copious saline irrigation. Some sockets had OCF placed into them to achieve haemostasis. 3-0, Black silk suture was used to close the wound edges after tooth delivered from the socket. All patients had an antibiotic cover of Amoxycillin 500 mg, Metronidazole 400 mg together with Ibuprofen 200 mg each 8 hourly for 5 days & chorhexidine mouth rinse to be used every 8 hours, beginning the next day following the operation. Sutures were removed after 5 days.

The results were analysed using the chi-square test.

III. Results
The study included 171 patients (95 males, 76 females); Total 208 extractions of mandibular third molars done. Mesioangular impaction was the commonest type of impaction removed, followed by distoangular and horizontal impaction (58%, 31% and 11% of the patients respectively). The age of the patients ranged from 20 to 48 years. Of the 208 mandibular third molar extractions, 40 sockets had OCF placed into them to achieve hemostasis.

Overall 22 patients reported to the oral surgery clinic after 2–4 days complaining of severe pain at the site of surgery. Clinical examination revealed that all these patients had developed Alveolar Osteitis (AO). Of the 22 patients, 13 were males and the remaining 9 were females. None of the females who developed this complication were taking oral contraceptives. The rest of the patients had an uneventful recovery. The overall incidence of AO was 10.6% (22/208 teeth removed) (TABLE). Of the teeth extracted and treated with OCF, 5% (2/40 teeth) showed AO (TABLE). In the teeth extracted and treated without OCF, 12.0% (20/168 teeth) developed AO, an incidence which is significantly higher that the OCF-treated group (Chi-Square test, P < 0.02).

<table>
<thead>
<tr>
<th>S. No.</th>
<th>No of Mandibular Third Molars Extracted</th>
<th>No of Cases (Sockets) reported with Alveolar Osteitis (AO)</th>
<th>Incidence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>With out Oxidized Cellulose Foam (OCF) pack</td>
<td>168</td>
<td>20</td>
<td>12%</td>
</tr>
<tr>
<td>With Oxidized Cellulose Foam (OCF) pack</td>
<td>40</td>
<td>02</td>
<td>05%</td>
</tr>
<tr>
<td>Total</td>
<td>208</td>
<td>22</td>
<td>10.6%</td>
</tr>
</tbody>
</table>

IV. Discussion
Alveolar Osteitis (AO) results from a disruption of the normal healing mechanism. The incidence rate of this event is variable, ranging from 4.1% to 32%, and associated with a number of predisposing factors as well as the type of prophylaxis used. In this study the overall incidence of AO after third molar extraction was 10.6%, which is similar to other findings previously reported. The incidence of dry socket among the OCF-treated teeth was significantly lower (5.0%) than in the non-OCF treated teeth (12.0%).

OCF is one of the most common biodegradable materials used to facilitate haemostasis and control bleeding. The material causes haemostasis by multiple mechanisms like Blood absorption, surface interactions with proteins & platelets, activation of both extrinsic & intrinsic pathways & it has bacteriostatic properties owing to its low pH along with its hypoallergenicity.

The phenomenon of AO in patients in whom OCF was used is probably reduced by its bacteriostatic properties which inhibits/prevents the fibrinolytic cascade triggered by the underlying infection.
Oxidized Cellulose Foam in Prevention of Alveolar Osteitis

Hypothesis, other probable suggested mechanism may be more clot stability at extraction socket site as it provides a scaffold which swells by absorption of blood & prevents clot dislodgement due to frictional grip that has been found to dislodge during pressure dressing changes and frequent oral rinses.

However, this was a simple study and a properly designed experimental study is needed to take account of the many confounding factors, such as the type of eruption pattern of the tooth, the degree of impaction of the tooth if present, the amount of surgical trauma rendered, and the amount of debridement and socket washing performed.

In summary, OCF is a potent haemostatic agent, the application of which in extraction sockets was associated with a decrease in the incidence of Alveolar Osteitis after mandibular third molar extraction. Routine use of OCF in all extraction sockets prophylactically is still questionable as it requires a comprehensive & properly designed experimental cohort study.

References

[31] Lehner T. Analysis of one hundred cases of dry socket. Dental practice, 1958, 8:75

www.iosrjournals.org 28 | Page