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Research Article

A Comparative Study on the Efficacy of Alvogyl, Neocone, Zinc Oxide Eugenol, and Iodoform Paste in the Management of Dry Socket

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Abstract

Introduction: Dry socket (alveolar osteitis) is a common, painful complication following tooth extraction, characterized by the loss of a stable blood clot and delayed healing. Despite various treatment options, there is no consensus on the most effective dressing material. This study aimed to compare the efficacy of Alvogyl, Neocone, Zinc Oxide Eugenol (ZOE), and Iodoform dressing in managing dry socket.

Materials and Methods: This prospective randomized study included 20 patients with clinically diagnosed with dry socket. Patients were randomly allocated into four groups (n=5 each): Group A (Alvogyl), Group B (ZOE), Group C (Neocone), and Group D (Iodoform dressing). Pain intensity was assessed using the Wong-Baker Visual Analogue Scale at multiple time points up to 10 days post-treatment. Clinical signs of healing, such as empty socket, exposed bone, and redness, were also evaluated. Statistical analyses included the Chi-square test, Z test for proportions, ANOVA, and Tukey HSD post-hoc tests.

Results: Alvogyl provided the fastest initial pain relief (mean 8.75 minutes), followed by Neocone, Iodoform, and ZOE. However, the shortest duration to complete pain relief was observed with Iodoform dressing (mean 4.2 days), followed by Neocone (4.9 days), Alvogyl (6.5 days), and ZOE (8.7 days). Neocone and Iodoform also demonstrated faster resolution of clinical signs, particularly in the healing of empty sockets and exposed bone.

Conclusion: While Alvogyl was most effective for rapid initial pain relief, Iodoform dressing and Neocone provided faster overall pain resolution and healing in dry socket cases.

Keywords: *Dry Socket, Alveolar Osteitis, Alvogyl, Neocone, Zinc Oxide Eugenol, Iodoform Paste, Post-Extraction Complications, Pain Management*

Introduction

Dry socket, or Alveolar osteitis (AO), is a common and painful complication after permanent tooth extraction. First described by Crawford in 1896 [1], it has been referred to by various terms such as localized osteitis, post-extraction osteomyelitis syndrome, alveolalgia, avascular socket, alveolitis sicca dolorosa, delayed extraction wound healing, and fibrinolytic alveolitis. However, "dry socket" remains the widely used term [2].

Proper healing after extraction relies on stable blood clot formation. Failure of clot formation or its breakdown leads to localized alveolitis, also known as dry socket [1].

Blum defines dry socket as “post-operative pain in and around the extraction site, increasing in severity between one and three days after extraction, associated with a partially or completely disintegrated blood clot, with or without bad breath (halitosis)" [3].

The etiology of dry socket's with relevent risk factors, prevention, and treatment has been inconsistently documented. It is considered multifactorial, involving general factors (age, sex, systemic diseases, nutritional deficiencies) and local factors (tooth location, surgical trauma, smoking, clot fibrinolysis, local circulation, anesthesia, and vasoconstrictors) [3,4]. Studies also link contraceptive use to dry socket, likely due to estrogen's impact on coagulation [5].

Management of dry socket involves irrigation, surgical intervention, and the use of medicated dressings containing antibacterials, topical anesthetics, obtundants, or their combinations, such as zinc oxide–eugenol pellets, Alvogyl, etc. It is difficult to define any approach as definitive "treatment," as the underlying etiology remains unclear. The consensus among experts is that the primary goal is pain relief while allowing normal healing to progress. There was a recognized need for a prospective randomized study to objectively evaluate the effectiveness of various dressings in managing pain and promoting healing in cases of Dry socket.

Material and Methods

This study was carried out with sample size of 20 patients in the department of oral and Maxillofacial Surgery, Peoples Dental Academy, Bhopal. Patients presenting with post-extraction pain were assessed to determine the underlying cause of their discomfort. Diagnosis of AO was clinically established on the basis of the following features

1. Pain localized to the extraction site, which may or may not radiate to surrounding areas, typically worsening in intensity between 1 and 3 days following the extraction.
2. Partial or complete loss of the blood clot within the alveolar socket, which may be accompanied by or occur without bad breath (halitosis).
3. Slower tissue regeneration compared to normal healing and Socket may appear dry with exposed bone.

Any other associated findings such as halitosis, lymphadenopathy, etc., were also recorded. 20 Patients were randomly assigned using randomization table to one of the four groups A, B, C and D with 5 patients in each group. Patients within these groups were managed as follows:

Group A: Management by Alvogyl (Manufactured by Septodont India Pvt. Limited. Content lodoform 15.8 gm, Eugenol B.P. 13.7 gm, and Butamben 25.7 gm)

Group B: Management by Zinc Oxide Eugenol. (Generic)

Group C: Management by Neocones. (Manufactured by Septodont India Pvt. Limited. Content Polymyxine B sulfate, Tytothricine, Neomycin sulfate, Tetracaine hydrochloride.)

Group D: Management by Iodoform dressing (Manufactured by Pyraxpolymars. Content Iodoform powder 15gm)

Procedure

All patients were thoroughly evaluated for pain levels, extent of bone exposure, and overall healing progress. In All treatment groups, the extraction sockets were gently irrigated with Betadine and sterile saline to remove any food debris. Curettage was deliberately avoided to preserve any remaining blood clot within the socket.

Pain intensity was measured using the Wong-Baker Visual Analogue Scale at several intervals: 5 minutes, 30 minutes, 1 hour, and on days 1, 2, 3, 5, 7, and 10 after the medicament was applied. If the patient continued to experience pain, the dressing was changed; however, no further dressing was applied if the patient had consistent pain relief for more than 48 hours.

Clinical signs of dry socket healing were checked on days 1, 3, 5, 7, and 10. Observations included the presence of an empty socket, exposed bone, and redness around the extraction site after removing the pack. If symptoms persisted beyond 10 days, daily follow-up assessments were conducted until improvement was noted.

All collected data were analyzed using the Chi-square test and the Z test for proportions. Results were presented using tables and graphs. A p-value less than 0.05 was considered statistically significant for both tests.

Results

Demographic Data

A total of 20 dry socket cases (1.82%) were reported among 1,100 tooth extractions. Of these, 13 cases occurred in females and 7 cases in males, resulting in a female-to-male ratio of approximately 1.86:1. This difference was not found to be statistically significant (χ^2 = 0.88, d.f. = 1, P = 0.35)

A total of 20 dry socket cases were reported, with a mean patient age of approximately 33 years. The distribution by age group was as follows:

Table 1. Age Distribution of Dry Socket Cases (N = 20).

Age Group (Years)	Number of Cases (n)	Percentage (%)
18–25	5	25.0%
26–35	9	45.0%
36–45	4	20.0%
46–55	1	5.0%
56+	1	5.0%
Total	20	100.0%

The highest incidence occurred in the 26–35-year age group, accounting for 45% of all dry socket cases. (χ^2=11, d.f=4, P=0.026). The result is statistically significant.

Teeth were grouped into anatomical sites for the purpose of analyzing dry socket distribution. Higher incidence of dry socket was found in the mandible (75 %), as compared to the maxilla (25 %). The difference was found to be statistically significant, (Z=2.08, P=0.038). The highest incidence of dry socket in the mandibular arch was seen in the third molar region, accounting for approximately 7 cases (35%). In the maxillary arch, the highest incidence was observed in the second molar region, with approximately 2 cases (10%). No cases were identified in the anterior region of either jaw. Chi -square analysis of the data indicated that the incidence of dry socket was significantly influenced by the extraction site in the mandibular arch [χ^2 = 100.926, d.f. = 7; P < 0.0001], but not in the maxillary arch [χ^2 = 13.97, d.f. = 7; P > 0.05].

Table 2: Jaw-wise Distribution of Dry Socket Cases (N = 20).

Jaw	Number of Cases (n)	Percentage (%)
Mandible	15	75.0%
Maxilla	5	25.0%
Total	20	100.0%

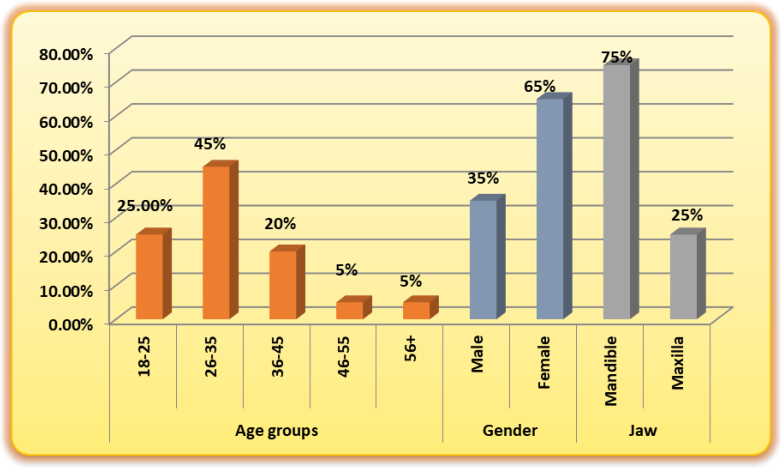

Figure 1. *Demographic distribution of study participants.*

Initial Pain Relief

The mean time to obtain initial pain relief with Alvogyl, Neocon Iodoform dressing and ZOE were 8.75,16.20,20.45 and 25.02 min respectively (i.e., Alvogyl<neocone<Iodoform dressing<ZOE pack) The difference in initial pain relief between all four groups was statically significant. Post-hoc analysis using the Tukey HSD test **(Table 4)** further confirmed these findings by showing significant pairwise differences between all treatment groups. Alvogyl was significantly more effective in providing faster pain relief compared to Neocone (mean difference = 7.45 minutes), Iodoform dressing (11.70 minutes), and ZOE pack (16.27 minutes), with all p-values being 0.000. Neocone also showed significantly faster pain relief than Iodoform dressing (mean difference = 4.25 minutes, p = 0.024) and ZOE pack (8.82 minutes, p = 0.000). Additionally, Iodoform dressing was significantly faster than ZOE pack (4.57 minutes, p = 0.015). These results indicate a clear hierarchy in effectiveness, with Alvogyl being the most effective, followed by Neocone, Iodoform dressing, and ZOE pack.

Table 3. Comparison of Mean Initial Pain Relief among Different Treatment Modalities for Dry Socket (In minutes).

Treatment Modalities	N	Mean (Min.)	SD	F-value	p-value
Alvogyl	5	8.75	1.56	54.836	0.000*
Neocone	5	16.20	1.47		
Iodoform dressing	5	20.45	2.12		
ZOE pack	5	25.02	2.89		

**Statistically significant*

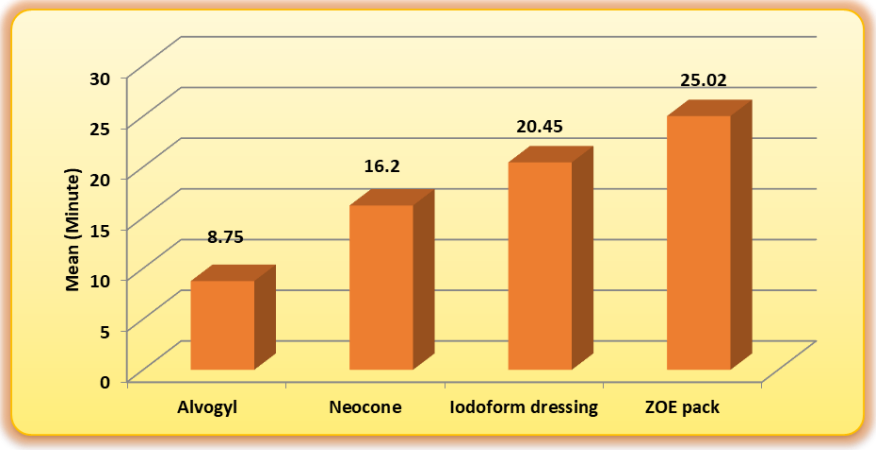

Figure 2. *Comparison of Mean Initial Pain Relief among Different Treatment Modalities for Dry Socket (In minutes).*

Table 4. Tukey HSD Post-hoc Comparison of Mean Initial Pain Relief between Treatment Modalities for Dry Socket.

Comparison	Mean Difference	95% Confidence Interval	p-value
Alvogyl vs Neocone	7.450	3.671 - 11.228	0.000*
Alvogyl vs Iodoform dressing	11.700	7.921 -15.478	0.000*
Alvogyl vs ZOE pack	16.270	12.491 -20.048	0.000*
Neocone vs Iodoform dressing	4.250	0.471 -8.028	0.024*
Neocone vs ZOE pack	8.820	5.041 - 12.598	0.000*
Iodoform dressing vs ZOE pack	4.570	0.791 - 8.348	0.015*

**Statistically significant*

Table 5. Comparison of Mean Complete Pain Relief among Different Treatment Modalities for Dry Socket (In days).

Treatment Modalities	N	Mean	SD	F-value	p-value
Alvogyl	**5**	**6.5**	**0.467**	**65.209**	**0.000***
Neocone	**5**	**4.9**	**0.644**		
Iodoform dressing	**5**	**4.2**	**0.597**		
ZOE pack	**5**	**8.7**	**0.484**		

**Statistically significant*

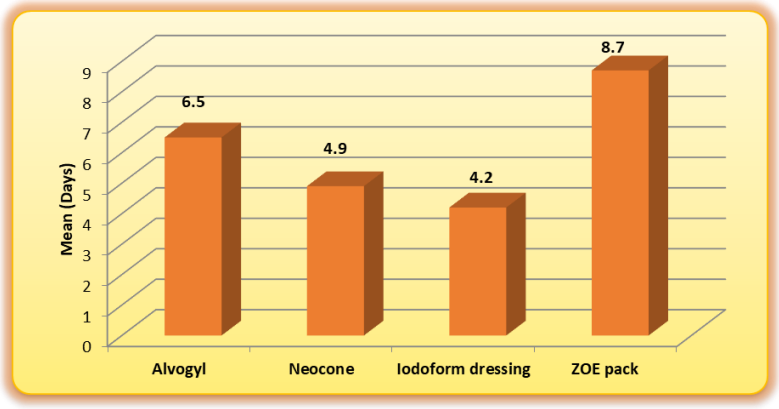

Figure 3. *Comparison of Mean Pain Relief among Different Treatment Modalities for Dry Socket (In days).*

Tukey HSD post-hoc analysis **(Table 6)** confirmed that Alvogyl required significantly more days for complete pain relief compared to Neocone (mean difference = -1.6 days, p = 0.0016) and Iodoform dressing (-2.3 days, p = 0.0000), but significantly fewer days than ZOE pack (+2.2 days, p = 0.0001). Neocone and Iodoform dressing did not show a statistically significant difference between them (p = 0.2284). However, Neocone provided significantly faster relief than ZOE pack (mean difference = +3.8 days, p = 0.0000), and Iodoform dressing was significantly faster than ZOE pack as well (+4.5 days, p = 0.0000).These findings suggest that while Alvogyl provides the fastest initial pain relief, it takes longer to achieve complete pain resolution compared to Neocone and Iodoform dressing. ZOE pack consistently demonstrated the slowest outcomes.

Table 6. Tukey HSD Post-hoc Comparison of Mean Complete Pain Relief among Four Treatment Groups.

Comparison	Mean Difference (Diff)	95% Confidence Interval	p-value
Alvogyl vs Neocone	-1.6000	-2.6007 to -0.5993	0.0016*
Alvogyl vs Iodoform dressing	-2.3000	-3.3007 to -1.2993	0.0000*
Alvogyl vs ZOE pack	2.2000	1.1993 to 3.2007	0.0001*
Neocone vs Iodoform dressing	-0.7000	-1.7007 to 0.3007	0.2284
Neocone vs ZOE pack	3.8000	2.7993 to 4.8007	0.0000*
Iodoform dressing vs ZOE pack	4.5000	3.4993 to 5.5007	0.0000*

**Statistically significant*

Signs of Healing

At the start of treatment, clinical evaluation revealed that all patients (n = 20; 100%) were experiencing severe pain. Additional signs and symptoms observed included halitosis in 10 patients (50%), a completely denuded socket (empty socket) in 12 patients (60%), partially exposed bone (bare bone) in 10 patients (50%), and redness surrounding the socket in 8 patients (40%).

Among the 12 patients presenting with empty socket (completely denuded socket), treatment was administered using Alvogyl, Neocone, Iodoform, and ZOE, with each group comprising 3 patients. In the Alvogyl group, 2 out of 3 sockets (66.7%) remained empty on the 3rd day of follow-up; however, this reduction was statistically significant ($P< 0.05$), and complete healing was observed by day 10. For patients treated with Neocone, only 1 socket (33.3%) remained empty on day 3, with full resolution achieved by day 7 ($P< 0.05$), making it the fastest among all groups. In the Iodoform group, a similar trend was noted, with 1 socket (33.3%) still empty on the 3rd day and all sockets completely healed by day 8 ($P< 0.05$). Conversely, in the ZOE group, 2 out of 3 sockets (66.7%) showed persistence of the sign on day 3, with significant improvement noted only by day 5, and complete healing achieved by day 11 ($P< 0.05$), making ZOE the slowest in resolving this symptom. Overall, Neocone demonstrated the most rapid resolution, while ZOE was the least effective in early healing of empty sockets.

Among the 10 patients presenting with bare bone (partially denuded socket), different dressing materials were used for management, including Alvogyl, Neocone, Iodoform, and ZOE. In the Alvogylgroup (n = 3), 2 sockets (66.7%) still exhibited bare bone on the 3rd day of follow-up, with complete resolution observed by day 10 ($P< 0.05$). For those treated with Neocone (n = 2), only 1 socket (50%) showed bare bone on day 3, and this sign resolved entirely by day 5 ($P< 0.05$), indicating the most rapid healing among all groups. In the Iodoform group (n = 3), 1 socket (33.3%) continued to show bare bone on the 3rd day, but complete healing was achieved by day 7 ($P< 0.05$). In contrast, the ZOE group (n = 2) had the slowest resolution, with both sockets (100%) still presenting bare bone on day 3. Although improvement was noted, one socket (50%) still showed the sign on day 10, with full healing only reached by day 12 ($P< 0.05$). Overall, Neocone facilitated the fastest resolution of bare bone, while ZOE was associated with the slowest recovery.

Among the 8 patients who presented with redness around the socket, treatment outcomes were assessed for Alvogyl, Neocone, Iodoform, and ZOE dressings. In the Alvogyl group (n = 2), 1 socket (50%) still exhibited redness on the 3rd day of follow-up, with complete healing achieved by day 10 ($P< 0.05$). Similarly, in the Neocone group (n = 2), 1 socket (50%) continued to show redness on day 3, but both sockets resolved entirely by day 10 ($P< 0.05$). For patients treated with Iodoform (n = 2), 1 socket (50%) also showed persistent redness on day 3; however, complete resolution occurred slightly earlier, by day 9 ($P< 0.05$). In the ZOE group (n = 2), both sockets (100%) still had redness on day 3, though all cases fully resolved by day 10 ($P< 0.05$). While all dressings were effective in achieving resolution by day 10, Iodoform demonstrated a marginally faster average recovery in reducing socket redness.

Table 7. Resolution of Clinical Signs Over Time.

Clinical Sign	Dressing	Day 3	Day 5	Day 7	Day 10
Empty Socket	Alvogyl (n=3)	2	1	1	0
	Neocone (n=3)	1	0	0	0
	Iodoform (n=3)	1	1	0	0
	ZOE (n=3)	2	1	1	0
Bare Bone	Alvogyl (n=3)	2	1	1	0
	Neocone (n=2)	1	0	0	0
	Iodoform (n=3)	1	1	0	0
	ZOE (n=2)	2	2	1	1 → 0*
Redness Around Socket	Alvogyl (n=2)	1	1	1	0
	Neocone (n=2)	1	1	1	0
	Iodoform (n=2)	1	1	0	0
	ZOE (n=2)	2	2	1	0

**One socket in ZOE group still had bare bone on Day 10, but resolved by Day 12.*

Discussion

Dry socket is a common postoperative complication characterized by inflammation of the extraction site, typically occurring 1–4 days after tooth removal. Clinically patients present with severe throbbing pain, malodor, and accumulation of food debris and a disintegrated clot within the socket. Most cases are reported within 7 days post-extraction. Traumatic extractions, poor surgical technique, smokers, female on oral contraceptive, inadequate socket debridement, old age, female sex, excessive vasoconstrictor in LA, and immune compromise patient have higher risk factor. Although its occurrence cannot be entirely prevented, dry socket remains the most frequent complication following dental extractions. Previous studies have reported an incidence of 1–4%[6], consistent with the present study's finding of 1.64%[7].

In our study out of 20 dry socket 13 occurrence in female and 7 in male with a ratio of 1.86:1. According to MacGragor[8] dry socket occurrence in females was significantly higher with female to male ratio 1.5:1.ygge et al[9] and Sweet and Butler[10] both reported that the use of oral contraceptive pills led to increased fibrinolytic activity in the blood and saliva of women during the menstrual phase, which is one of the causes of increase incidence of dry socket among females.

In this study a mean patient age of approximately 33 years. The highest incidence occurred in the 26–35-year age group, accounting for 45% of all dry socket cases. The result is statistically significant with a P Value (P=0.026) similarly Majati et al[11]. reported that the affected age range was between 15 and 65 years, with an average age of 32.78 years. Similarly, Rauf et al[12]. observed a mean age of 32.9 years among patients presenting with dry socket, while Fahimuddin et al[13]. found the mean age at presentation to be 31.68 years Faizel et al.[14] also found the relation of age group and dry socket to be statistically significant with the highest incidence of dry socket in the age group of 21–40 years. Dry socket incidence is higher in younger adults due to their denser bone and better blood supply, leading to an increased fibrinolytic activity that predisposes to clot breakdown.

In the study incidence of dry socket was found to be statistically significant (P=0.038) in the mandible (75 %), as compared to the maxilla (25 %).

The results of our study are inconsistent with the result obtained by Nusair et al.[15], Amaratunga et al.[16], Fahimuddin et al.[13],Majati et al.[11] and Faizel et al.[14]The reason may be attributed to greater bone density limited granulation tissue formation in the mandible, higher negligence of the patient to oral hygiene measures and a higher caries index making molars severely decayed which cause fracture during extraction.

In our study the fastest average time for initial pain relief was 8.75 minutes with Alvogyl due to its unique combination of ingredients and physical properties. It contains eugenol, which acts as an immediate analgesic, and butamben, a local anesthetic that enhances the numbing effect, offering quick and sustained relief from pain. Additionally, the iodoform component has antiseptic properties, helping control infection and aiding the healing process. The fibrous, sponge-like base of Alvogyl ensures it stays in the socket longer, forming a protective barrier that soothes the exposed bone and nerve endings. The differences in pain relief times among all four groups were statistically significant. Tukey HSD post-hoc analysis (Table 7) further confirmed significant differences between each pair of treatments. The fastest mean duration for complete pain relief was 4.2 days with Iodoform due to its strong antiseptic and antibacterial properties, effectively reducing infection and inflammation at the socket site. This rapid control of infection helps accelerate healing, leading to faster resolution of pain compared to other medicaments. The differences among all four groups were statistically significant (P-value), with Iodoform dressing providing the fastest complete pain relief. According to Faizel et al.[14]the fastest initial pain relief was provide by Alvogyl and least was by ZOE with mean 7.3 and 25.02 minutes respectively and similar study by Sun, Yq., Sun, R. & Zhao, Jh.[17] and Faizel et al[14] fastest pain relief by Iodoform on an average of 5 days and least by ZOE with an average 8.5 days.

In our study signs of Empty socket was completely resolved on 5th day by Neocone and on 7th day byAlvogyl and ZOE. Signs of Bare bone completely subsides around 5th day by Neocone, around 7th day by Iodoform, around 10th day by Alvogyl and beyond day it persist in case of ZOE. Redness around sockets are subside by 7th day in case of Iodoform and for other medicament it subsides on 10th day.

According to Tewari NK et al.[18] signs of Empty socket, Bare bone, Redness around socket subsides completely by Neocone on around 10th,7th,10th days respectively and for ZOE Redness subsides around 10th day and empty socket and bare bone persist beyond 10th days.

According to Faizel et al.[14] By the 7th day, the Neocone group showed complete healing in most cases, with only 6.67% showing residual redness. In comparison, 33.33% in the ZOE group and 21.05% in the Alvogyl group had persistent socket emptiness. Exposed bone and redness also remained more common in the ZOE and Alvogyl groups beyond day 7.

Conclusion

All four medicaments showed effectiveness in managing dry socket. However:

- Alvogyl was superior in rapid initial pain relief because it combines eugenol and butamben for immediate and long-lasting pain relief, iodoform for its antiseptic action, and a fibrous base that protects the exposed bone and nerve endings while slowly releasing active ingredients.
- Iodoform showed the fastest overall healing and complete relief due to its strong antiseptic and antibacterial properties, quickly reducing infection and inflammation to speed up healing.
- Neocone demonstrated consistent, moderate performance in both early and late stages.
- ZOE was effective but comparatively slower in action.

This study underscores the efficacy of Alvogyl and Iodoform in dry socket management. Larger-scale randomized studies are recommended to further validate these findings and explore optimal treatment protocols.

Conflict of Interest

None declared.

Acknowledgment

None.

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