# Cement-Associated Signs of Inflammation: Retrospective Analysis of the Effect of Excess Cement on Peri-implant Tissue

Michael Korsch, DDS[a]/Bernt-Peter Robra, MPH[b]/Winfried Walther, DDS[c]

***Purpose:*** Excess cement left in the peri-implant sulcus after the placement of prosthetic restorations risks inflammation in the peri-implant tissue. While many current studies deal with the question of how to avoid undetected excess cement, relatively little is known about the clinical consequences of this complication. This study analyzed the clinical findings associated with excess cement. Further, the influence of the sojourn time of undetected excess cement in the peri-implant pocket on clinical findings was investigated. ***Materials and Methods:*** Within the scope of a retrospective clinical follow-up, the suprastructures that were originally cemented with a methacrylate cement were revised in 93 patients (171 implants). The patients were split into two groups according to the time between placement of the prosthetic restoration and revision. Group 1 (G1) had treatment revisions within 2 years of restoration placement (71 patients with 126 implants); in group 2 (G2), treatment revisions were conducted at a later time (22 patients with 45 implants). For the purpose of statistical analysis, both groups were further analyzed based on the presence/absence of excess cement at the time of revision. ***Results:*** By definition, the average time to revision in G1 was shorter than in G2 (0.71 years versus 4.07 years). There was no significant difference in the frequency of excess cement at revision between G1 (59.5%) and G2 (62.2%). The clinical findings around the implants in G1 were significantly less severe than in G2 (bleeding on probing: G1 without excess cement—17.6%, G1 with excess cement—80%, G2 without excess cement—94.1%, G2 with excess cement—100%; suppuration: G1 without excess—0%, G1 with excess cement—21.3%, G2 without excess cement—23.3%, G2 with excess cement—89.3%). After removing the excess cement, cleaning and disinfecting the implant abutment and restoration, and using a different cement, significantly fewer signs of inflammation were found at further follow-up in both groups. ***Conclusions:*** Within the limitations of this retrospective observational study, excess cement was present in a high number of cement-retained implant restorations. Signs of inflammation were present in a large proportion of implants at short- to medium-term follow-up. At the time of restoration revisions, the clinical observation of previously undetected excess cement was associated with increased prevalence of inflammation. Removal of excess cement significantly reduced the signs of inflammation. *Int J Prosthodont 2015;28:11–18. doi: 10.11607/ijp.4043*

[a]*Head of Oral Surgery, Dental Academy for Continuing Professional Development, Karlsruhe, Karlsruhe, Germany.*
[b]*Professor, Institute of Social Medicine and Health Economics, Otto-von-Guericke-University of Magdeburg, Magdeburg, Germany.*
[c]*Professor, Director, Dental Academy for Continuing Professional Development, Karlsruhe, Karlsruhe, Germany.*

***Correspondence to:*** *Michael Korsch, Dental Academy for Continuing Professional Development, Lorenzstrasse 6, 76135 Karlsruhe, Germany. Fax: 0049/7219181222. Email: michael-korsch@za-karlsruhe.de*



Fixed dental restorations can be retained on implants either by screws or cementation. Both procedures have a proven long-term track record and pose different risks in follow-up care.[1–3] In the case of cementation, excess cement left in the peri-implant sulcus poses a problem, as it promotes the formation of a biofilm,[4,5] leading to inflammation in the peri-implant tissue.[6–8] Wilson found excess cement at 81% of the implants with signs of peri-implant disease.[8] After removing the excess cement, 74% of these implants were free of inflammation. The loss of attachment at the implants with excess cement has been reported in individual cases.[9,10] Korsch et al confirmed the clinical

**Fig 1a** Abutment with undetected excess cement *(arrow)* after removal.

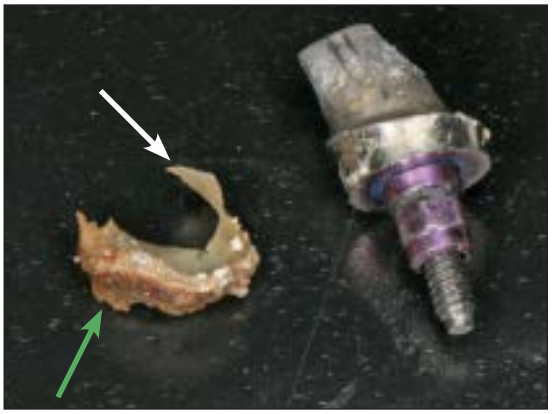

**Fig 1b** Excess cement removed. Two parts of excess cement can be distinguished: A smooth part without discoloration *(white arrow)* found inside the crown and another part found between the abutment and peri-implant tissue *(green arrow)* that markedly differed in coloration and surface structure.

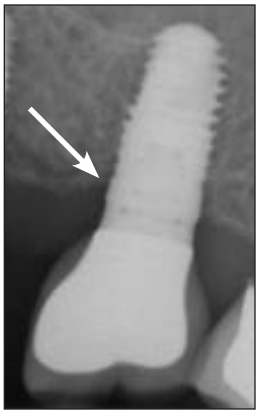

**Fig 1c** Radiograph, at time of revision, showing the peri-implant bone level *(arrow)* at the maxillary left second molar.

findings and the attachment loss associated with excess cement and obtained similar results.[6,7] Relatively little is known about the frequency of undetected excess cement. When a temporary implant cement was used, excess cement was found on 59.5% of the implants after revision of the suprastructure.[6] So far, only the implant diameter[7,11] and the depth of the cementation margin[12] have been identified as predictors of excess cement. In the cases of larger implant diameters and deeper cementation margins, significantly more excess cement was found. In the anterior region, implants of smaller diameter often can be placed. But, in the esthetic zone, a deep cementation margin position cannot always be avoided. In the posterior region, however, the cementation margin can easily be placed slightly submarginally or paramarginally. In the molar region, often implants with larger diameters are inserted for biomechanical reasons. In the more recent literature, many possibilities for minimizing this risk of excess cement have been described.[12–15] Some studies recommend vent holes in abutments and suprastructures as a means of decreasing the frequency and the amount of postcementation excess cement retention.[16,17] Other publications describe cementation protocols that are assumed to be less risky in terms of subgingival excess cement extrusion and its postcementation retention.[13,18] Some authors recommend taking radiographs after cementation and removal of excess cement to preclude any potential undetected excess cement.[19,20] This diagnostic means is rather limited in its possibilities, however. The radiograph shadow prevents the vestibular and oral evaluation of the implant and suprastructure. The insufficient radiopacity of small pieces of excess cement often makes it impossible to visualize them. In addition, some dental cements are not, or not sufficiently, radiopaque.[21]

The aim of the present retrospective observational study was to determine which clinical findings are associated with excess cement and whether the length of time excess cement is left in the peri-implant sulcus is associated with the clinical conditions around implants.

## Materials and Methods

In the period from April 2009 until February 2010, the outpatient clinic of the Karlsruhe Dental Academy for Continuing Professional Development used a methacrylate cement (Premier Implant Cement, Premier Dental Products) for the placement of fixed suprastructures on implants. This cement was used because it provided good retention of the suprastructures and yet made revision easy. In this period, 105 patients with 198 implants were prosthetically restored. All implants were inserted by one oral surgeon. The suprastructures were inserted by nine prosthodontists.

A few months later, some of the patients developed complications, ie, suppuration around the implants. After clinical evaluation of these patients, the suprastructures including the abutments were revised (details of the revision protocol are described later in this article). In all cases, excess cement was found between the abutment and peri-implant tissue (Fig 1). After removing the excess cement and rinsing the implant and the peri-implant tissue with chlorhexidine 0.12 % (GUM PAROEX nonalcohol rinse 0.12%, Sunstar Suisse), chlorhexidine gel 0.20% was placed in the hollow space of the implant. Finally, the suprastructure was recemented with Temp Bond (Temp Bond, Kerr Sybron Dental Specialities). The patients were followed up 3 to 4 weeks after revision. The signs of inflammation had disappeared around all implants.

Of these complications described, all patients who had been treated with the methacrylate cement were actively recalled for revision of the suprastructures.

All patients were sent detailed written information about possible cement-associated inflammation. Subsequently, 103 of the 105 patients were contacted by telephone. Two patients could not be reached. As a result of this recall campaign, 71 patients (69%) presented at the outpatient clinic of the academy to have their suprastructures revised. Another 11 patients agreed on a revision date but did not show up. Twenty-one patients refused the revision of their suprastructures despite the information about cement-associated complications. After evaluation of the initial data (at the end of 2012), it was the authors' justified concern that the treatment previously rendered posed a risk. Therefore, the authors continued their effort to convince the remaining 32 patients not yet revised that they, too, should present at the outpatient clinic. This turned out to be extremely difficult. Some patients had to be called by phone several times. In many cases the patients agreed on a revision date only after intense personal discussion with the clinician. Until December 2013, another 22 patients presented for revision of their suprastructures. Seven other patients continued to refuse any revision, and 3 patients could not be contacted this time.

The subdivision of the patients into two groups was not planned in advance but resulted from the follow-up process. In 71 patients (126 implants), the suprastructures were initially re-treated within the first 2 years after placement of the dental restorations (Table 1).[6,7] The cases revised within this period were designated as G1. The patients who did not agree to revision therapy at the beginning and had to be contacted repeatedly before they followed the authors' recommendation later were designated as G2. These 22 patients were revised until December 2013. The revision procedure was the same in both groups.

### *Study Population (Table 1)*

G1 (patients initially revised within 2 years) comprised 71 patients with 126 implants examined 2 to 21 months after cementation. Thirty-four of them were men, 37 were women. The age of the patients at the time of cementation was between 32 and 80 years (average: 60.5 years). These patients had an average of 1.8 prosthetically restored implants.

G2 (patients revised at a later time) comprised the suprastructures of 22 additional patients (14 men, 8 women) with 45 implants revised 42 to 55 months after cementation. Their age at the time of cementation was between 19 and 77 years (average: 59.1 years). The average number of implants per patient was 2.0.

**Table 1** Patient Data

| | Group 1 (%) | Group 2 (%) | Significance |
|---|---|---|---|
| Male | 34 (48) | 14 (64) | |
| Female | 37 (52) | 8 (36) | NS |
| Average age at time of placement of prosthetic restoration | 60.5 y | 59.1 y | NS |
| Average number of implants per patient | 1.8 | 2.0 | NS |
| Time to revision | 0.71 y | 4.07 y | NA |

NS = not significant; NA = not applicable.

The two groups were further subdivided into implants with and without excess cement.

### *Documentation and Revision—Clinical Procedure*

All G1 and G2 patients were informed about the reasons for and the necessity of the re-treatment procedure at the time when the revision was scheduled and immediately before it started. The documentation and revision protocol proceeded as follows:

- The peri-implant sulcus was probed at six sites around each implant before the suprastructures were removed. Bleeding on probing (BOP) and pocket suppuration were documented and analyzed at the implant level.
- The suprastructures were removed with pliers, and the abutments were unscrewed.
- The presence or absence of cement in the region of the peri-implant tissue was documented.
- All excess cement was removed from the peri-implant tissue, abutment, and crown.
- The abutment and crown were cleaned with ethanol. The peri-implant tissue and the implant were rinsed with chlorhexidine 0.12%, and chlorhexidine gel 0.2% was placed in the hollow space of the implant.
- The abutment was replaced, and the suprastructure was recemented with Temp Bond.
- If any inflammation was diagnosed (BOP or suppuration), a follow-up examination was scheduled 3 to 4 weeks after revision.
- At follow-up, all implants were again probed at six sites. The presence of BOP and/or suppuration was documented.

The cementation protocol at the revision with Temp Bond was the same that had initially been used for cementation with Premier Implant Cement.

**Table 2** Clinical Findings Around Implants at Time of Revision

| | Group 1 without excess cement (%) | Group 1 with excess cement (%) | Group 2 without excess cement (%) | Group 2 with excess cement (%) | Total number of implants | Statistical test |
|---|---|---|---|---|---|---|
| BOP present | 9 (17.6) | 60 (80) | 16 (94.1) | 28 (100) | 113 | Chi-square with 3 *df* 80.194; $P < .001$ |
| No BOP | 42 (82.4) | 15 (20) | 1 (5.9) | 0 (0) | 58 | |
| Suppuration present | 0 (0) | 16 (21.3) | 4 (23.5) | 25 (89.3) | 45 | Chi-square with 3 *df* 70.5; $P < .001$ |
| No suppuration | 51 (100) | 59 (78.7) | 13 (76.5) | 3 (10.7) | 126 | |
| Total number of implants | 51 | 75 | 17 | 28 | 171 | |

### *Statistical Methods*

The data were compiled with Excel and analyzed with SPSS Statistics version 21 (IBM SPSS Statistics) on Windows XP (Microsoft). Statistical methods used were cross-tabulation with chi-square tests for categorical data. Means were compared by *t* tests. Associations between binary outcomes and multiple independent variables were analyzed by binary logistic regression.

## Results

G1 revisions comprised 126 implants in 71 patients; G2 comprised 45 implants in 22 patients. The number of implants per patient ranged between 1 and 5 during both revision phases. The average time to revision (interval between initial placement of the prosthetic restoration and revision of the suprastructure) was 0.71 years in G1 and 4.07 years in G2 (see Table 1). The two groups were not significantly different (on patient level) in terms of sex, average age, and average number of implants per patient.

### *Clinical Findings at Implant Level*

The relative frequency of implants with BOP was significantly higher in the G2 patients compared to the G1 patients (chi-square: 27.373; $P < .001$). Whereas 54.8% of all implants in G1 were affected by BOP, the proportion was 97.8% in G2. The frequency of excess cement on the implants of G1 (59.5%) and G2 (62.2%) did not differ significantly. Suppuration around the implants, however, was significantly more frequent in G2 (64.4%) than in G1 (12.7%; chi-square: 45.788; $P < .001$).

### *Association Between BOP and Presence of Excess Cement at Implant Level (Table 2)*

In G1 patients without excess cement, 17.6% (9) of the implants were affected by BOP, whereas with excess cement 80% (60) of the implants were affected. With longer time to revision, the BOP score in G2 increased in the implants with excess cement (100%; 28 implants) as well as in those without excess cement (94.1%; 16 implants). There was only one implant that had no BOP in G2 patients. The difference among the four subgroups (G1 and G2 each were split into a subgroup with and without excess cement) was significant (chi-square with 3 *df:* 80.194; $P < .001$). Although the two subgroups (with and without excess cement) of G1 clearly differed in terms of BOP, there was very little difference in G2. Taking both excess cement and time to revision (ie, group) into account as independent variables at the same time, binary logistic regression analysis showed significant associations between BOP and both independent variables (Table 3).

### *Association Between Suppuration and Presence of Excess Cement at Implant Level (Table 2)*

No implant in G1 without excess cement had suppuration. But 21.3% (16) of the implants with excess cement in G1 were so affected. Whereas only 23.5% (4) of the implants without excess cement in G2 had suppuration, the figure rose to 89.3% (25) for the implants with excess cement. The difference among the four subgroups was significant (chi-square with 3 *df* 70.5; $P < .001$). Taking both excess cement and time to revision (ie, group) into account as independent variables at the same time, binary logistic regression analysis showed significant associations between suppuration and both independent variables (Table 3).

### *Findings at Follow-up at Implant Level (Table 4)*

Patients with at least one implant showing signs of inflammation (either BOP or suppuration) at the time of revision were scheduled for follow-up. A total of 42 patients from G1 (73 implants) presented for a follow-up examination. All 22 patients of G2 presented for follow-up.

**Table 3** Bleeding on probing (BOP) and Suppuration (Sup) Association with Excess Cement and Time to Revision (Logistic Regression)

| | B | Standard error | Wald | *df* | Sig | Exp(B) | 95% confidence interval for Exp(B) Lower | Upper |
|---|---|---|---|---|---|---|---|---|
| **Excess cement** | | | | | | | | |
| BOP | 2.945 | .465 | 40.156 | 1 | .000 | 19.012 | 7.646 | 47.273 |
| Sup | 3.573 | .777 | 21.168 | 1 | .000 | 35.636 | 7.777 | 163.303 |
| **Time to revision (group)** | | | | | | | | |
| BOP | 4.417 | 1.079 | 16.747 | 1 | .000 | 82.843 | 9.989 | 687.049 |
| Sup | 3.603 | .656 | 30.175 | 1 | .000 | 36.713 | 10.151 | 132.784 |
| **Constant** | | | | | | | | |
| BOP | −1.552 | .367 | 17.899 | 1 | .000 | .212 | NA | NA |
| Sup | −4.908 | .804 | 37.231 | 1 | .000 | .007 | | |

B = coefficient; Exp(B) = the exponentiation of the B coefficient, which is an odds ratio;
NA = not applicable.

**Table 4** Clinical Findings at Follow-up

| | Group 1 without excess cement (%) | Group 1 with excess cement (%) | Group 2 without excess cement (%) | Group 2 with excess cement (%) | Total number of implants | Significance |
|---|---|---|---|---|---|---|
| BOP present | 0 (0%) | 9 (26%) | 4 (25%) | 8 (28.6%) | | NS |
| No BOP | 5 | 25 | 12 | 20 | | |
| Total number of implants | 5 | 34 | 16 | 28 | 83 | |
| Suppuration present | 0 (0%) | 0 (0%) | 0 (0%) | 3 (12%) | | NS |
| No suppuration | 0 | 6 | 4 | 22 | | |
| Total number of implants | 0 | 6 | 4 | 25 | 35 | |

NS = not significant.

### *BOP at Follow-up*

Of the 69 implants of G1 with BOP at the time of revision, 39 could be reexamined. Thirty-four of the 39 implants had excess cement at the time of revision. None of the 5 implants without excess cement had BOP at follow-up. Of the 34 implants with excess cement, only 9 implants had BOP at follow-up. This represented a 74% reduction in BOP.

Of the 44 implants of G2 that had demonstrated BOP at the time of revision, 28 had excess cement at revision. Of these 28 implants, only 8 had BOP at follow-up. This represents a 71% reduction in BOP. Of the 16 implants without excess cement, only 4 demonstrated BOP at follow-up. This represented a 75% reduction in BOP. There were no significant differences among the four subgroups.

### *Suppuration at Follow-up*

No implant of G1 without excess cement demonstrated suppuration at revision or follow-up. Sixteen implants of G1 with excess cement demonstrated suppuration at revision. Six of these implants with suppuration were reexamined at follow-up. None of these six implants demonstrated suppuration at follow-up. This represented a 100% reduction in suppuration.

At revision, 29 of 44 implants in G2 had pocket suppuration. In 25 of them, excess cement had been found at revision. All 29 affected implants were reexamined at follow-up. The 4 implants that had pocket suppuration, but no excess cement when the crown was re-treated, were free of inflammation at follow-up. Only 3 of the 25 affected implants with excess cement demonstrated suppuration at follow-up. This represented an 88% reduction in suppuration. There were no significant differences among the four subgroups. The loss of attachment around these 3 implants, in 3 patients, was 5 to 7 mm. In view of these findings, the three implants were removed later in shared decisions with the respective patients.

## Discussion

The risk posed by undetected excess cement is well known.[9,10] However, there are very few studies showing a clinical effect on the peri-implant tissue.[6–8] Most scientific studies mainly describe techniques to avoid undetected excess cement[12–15] or the retentiveness of

implant cement.[22,23] But, it must be assumed that the complete avoidance of excess cement is clinically impossible.[6] A special risk when using methacrylate cement has recently been described for the first time.[6,7] Little is known about the effect of the sojourn time of undetected excess cement in the peri-implant pocket on the peri-implant tissue.

The present publication was not a planned study. The authors started from casual observations that after cementation clinical complications occurred that were associated with the presence of excess cement and abated after its removal. Based on these observations, the authors assumed risk of methacrylate cement to the peri-implant tissue and started to recall the total patient cohort at risk for a revision of the implant-supported suprastructures. Of the 105 patients, 103 could be contacted by telephone.

A prospective controlled study for the evaluation of the association between excess cement and risk of inflammation is of course unethical and not acceptable.

Only 71 patients (G1) did follow the authors' request in due time. Another 22 patients (G2) could only be convinced of revision at a much later time and at great cost. This is why the time to revision differed considerably, giving the authors the opportunity to look at the impact the time of undetected excess cement might have on the peri-implant tissue.

As the two groups did not differ significantly in terms of sex, average age, average number of implants per patient, and frequency of excess cement left in the mouth, homogeneity of the total population can be assumed. The frequency of undetected excess cement was around 60% in both groups. This proportion appears to be very high and may possibly be explained by the material characteristics of the cement used in these patients. At the time the cement was used it was not radiopaque[21] and, hence, could not be detected in the radiographs.

It is an interesting clinical observation that the dentists involved in the project were unable to detect the excess cement after the cementation procedure. They all were experienced prosthodontists, so lack of experience or care cannot be implied. With no exception, the excess cement was submucosal. In general, it is very difficult to detect excess material at the level of the implant shoulder, below the abutment. Such excess cement could not be diagnosed with the standard instruments (probes) at revision, but became visible only after the removal of the abutment. Even at the time of revision the only means of detecting excess cement was the removal of the suprastructures, including the abutments.

The literature does not provide any information about the frequency of undetected excess cement. Wilson arrived at similar clinical findings in connection with excess cement but did not say anything about the frequency of excess cement.[8]

Overall, BOP was significantly associated with the time to revision and the presence of excess cement. Whereas in G1, BOP was clearly associated with excess cement, no difference was found in G2. However, the BOP score clearly rose from G1 to G2 for implants with and without excess cement. Only one implant of G2 was not affected by BOP.

Pocket suppuration also was significantly associated with the time to revision and the presence of excess cement. In G1, suppuration was only found at implants with excess cement. Implants without excess cement did not demonstrate any pocket suppuration. In G2, suppuration was found around four (25%) implants without excess cement, and around 25 of 28 (89.3%) implants with excess cement. Wilson described inflammation at 81% of the implants with excess cement.[8]

In the follow-up examination 3 to 4 weeks after revision, the signs of inflammation had clearly subsided in both groups. BOP at follow-up had decreased by 74% in G1 with excess cement. None of the five implants of G1 without excess cement showed BOP at follow-up. In G2, implants with excess cement had a 71.4% reduction of BOP and implants without excess cement, 75%. The BOP reduction was distinct in all four subgroups. It remains unclear whether this was the result of revision, per se, the use of a different cement (Temp Bond), or a combination of both.

Pocket suppuration was reduced by 100% in G1 with excess cement. None of the implants without excess cement showed suppuration at the time of revision or at follow-up. In G2 implants with excess cement, suppuration decreased by 88%. After removal of the excess cement around the implants, Wilson stated a 75.7% reduction in the signs of inflammation.[8] It should be particularly emphasized that four implants in G2 demonstrated suppuration at revision without any excess cement present. At follow-up these signs of inflammation had disappeared. It is unclear in these cases whether the time factor or the material properties of the cement had an effect on suppuration. Dental materials that contain methacrylate generally involve the risk of biofilm formation.[5] Possibly the cement gap between crown and abutment favored the formation of a biofilm in these four cases.

Three implants of three patients in G2 with excess cement demonstrated persistent pocket suppuration at follow-up. In all three cases, the attachment loss amounted to 5 to 7 mm. After making shared decisions with the respective patients, the dentists removed the implants at a later time. The removal of the excess cement during revision quite distinctly led to a

marked reduction in the signs of inflammation at follow-up. After recementation with the zinc oxide–eugenol cement (Temp Bond), considerably fewer signs of inflammation were found in all four subgroups. It is assumed that zinc oxide–eugenol cement has an antibacterial effect.[24] In vitro studies showed that Temp Bond will dissolve upon contact with fluid.[25] Possibly this characteristic of the cement causes less excess cement in the peri-implant sulcus in the long term with fewer complications as a result.

The statistical differences between the two groups with regard to the findings (BOP and suppuration) must not mislead clinicians into ignoring that the groups might also differ in characteristics other than sojourn time. Patients who immediately respond to the dentist's invitation (G1) possibly care about their health more than patients who do not show up or do so only after having been expressly urged (G2). The results also may have been distorted by the fact that patients with severe concomitant diseases may not be willing to follow the dentist's invitation. This may have influenced the clinical findings.

There is evidence that misfitting fixed cement-retained suprastructures on implants lead to increased bone loss.[26] One reason could be the higher amount of cement in the marginal gap between denture and abutment. This could possibly enhance the formation of a biofilm in the peri-implant tissue. Several studies have compared fixed screw-retained and fixed cemented implant-supported restorations with regard to the peri-implant bone loss.[27,28] The results reported in the literature are contradictory. The fact that excess cement has a big effect on both peri-implant tissue and loss of attachment[7] may be an explanation for these contradictory results. Moreover, the types of cement, ie, Premier Implant Cement and Temp Bond, used in the present study apparently had an essential influence on the response of the peri-implant tissue. Therefore, long-term studies comparing fixed cemented implant-supported restorations with other structures in terms of the peri-implant tissue stability should consider and report the type of cement used as a relevant clinical parameter.

Future clinical studies should clarify the changes in the microbial spectrum over the duration of undetected excess cement in the peri-implant tissue. Another aim should be to specify the cements that minimize the tendency of biofilm formation.

## Conclusions

Within the limitations of this retrospective observational clinical study, excess cement was present in a large proportion of cement-retained implant restorations. Signs of inflammation were present in a large proportion of implants at short- to medium-term follow-up. Presence of undetected excess cement was associated with increased prevalence of inflammation. Removal of excess cement and performance of basic anti-infective measures swiftly and significantly reduced the signs of inflammation.

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*Literature Abstract*

**Public awareness of head and neck cancers: A cross-sectional survey**

The authors conducted an online survey through Harris Interactive (Rochester, New York, USA) to assess the awareness and knowledge of head and neck cancer (HNC) among US adults. The survey respondents (n = 2,126), ages 19 to 92 years, were randomly selected from the Harrison Interactive online panel. Results showed that *(1)* 66.0% of the respondents reported "not very"or "not at all" knowledgeable about HNC. This low self-reported knowledge of HNC was unrelated to respondent's tobacco use, education level, gender, or race. *(2)* Only 22.1% of respondents correctly identified the throat as organs or tissues involved by HNC; mouth (15.3%); and larynx (2.0%). And 21.0% incorrectly identified the brain. *(3)* Concerning symptoms of HNC, 14.9% correctly identified "red or white sores that do not heal"; "sore throat" (5.2%); "swelling or lump in the throat" (1.3%); and "bleeding in the mouth or throat" (0.5%). A total of 19.0% incorrectly identified headache. *(4)* Regarding risk of HNC, 54.4% correctly identified smoking; chewing or spitting tobacco (32.7%); alcohol use (4.8%); human papillomavirus (HPV) (0.8%); and prolonged sun exposure (0.6%). *(5)* Specific question about association between HPV and throat cancer showed that 12.8% of respondents were aware, and most of them were with college or university degrees (14.8% versus 10.0%; $P = .001$). *(6)* In contrast, 70.0% of respondents were aware of HPV vaccines. Most of these respondents were with college or university degrees (76.7% versus 60.4%; $P < .001$) and women (80.6% versus 57.1%; $P < .001$). The authors concluded that US adults have limited knowledge about HNC, and it is important to improve public awareness and knowledge of signs, symptoms, and risk factors of HNC.

**Luryi AL, Yarbrough WG, Niccolai LM, Roser S, Reed SG, Nathan CA, Moore MG, Day T, Judson BL.** *JAMA Otolaryngol Head Neck Surg* 2014;140:639–646. **References:** 50. **Reprints:** Benjamin L. Jusdon. MD, Yale Otolaryngology, 333 Cedar St, PO Box 208041, New Haven, CT 06520, USA. Email: Benjamin.judson@yale.edu—*Simon Ng, Singapore*