# A Review of Amalgam and Composite Longevity of Posterior Restorations

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**Key-words:**
Restorative dentistry;
Longevity;
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Composite;
Posterior teeth.

**Abstract:** Failure of dental restorations is a major concern in dental practice and its replacement constitutes the majority of the operative work. The purpose of this study is to review the longevity of Class I and II amalgam and direct composite restorations in posterior permanent teeth, and to discuss possible reasons for clinical failure. On average, longevity of resin composite restorations in posterior teeth is two to three times lower than amalgam restorations. The resin composite is an appropriate material to restore small Class I and Class II lesions, with margins located in enamel, on patients with low caries risk and, when complete field isolation can be achieved. The use of amalgam is preferable to the use of composite in large and complex restorations, with margins located in dentine or cement, where isolation is deficient. Durability of dental restorations is dependent upon many different factors, such as: operator skills, materials used, technique used, patient compliance and oral environment. The main reasons for restorations failure were secondary caries, restoration fracture, tooth fracture and marginal defects.

**Palavras Chave:**
Dentisteria restauradora;
Longevidade;
Amálgama;
Compósito;
Dentes posteriores.

**Resumo:** A falha das restaurações dentárias tornou-se uma das maiores preocupações na prática da medicina dentária e a sua substituição constitui a maior parte do trabalho do médico dentista generalista. Pretende-se com esta apresentação abordar a longevidade de restaurações em amálgama e resina composta em dentes posteriores permanentes, para as cavidades classe I e II, bem como as possíveis razões que podem levar à sua falha clínica. Em média, as restaurações em compósito nos dentes posteriores têm uma longevidade duas a três vezes menor do que as restaurações em amálgama. A resina composta é um material apropriado para a restauração de pequenas cavidades classe I e II com as margens localizadas em esmalte, em pacientes com baixo risco de cárie e nos casos em que o campo operatório pode ser adequadamente isolado. O uso da amálgama é preferível ao do compósito em restaurações extensas e complexas, com margens em dentina ou cemento, onde o isolamento é deficiente. A durabilidade das restaurações encontra-se dependente de vários factores, tais como: condicionantes do operador, material utilizado, técnica usada, colaboração do paciente bem como do ambiente da cavidade oral. As principais razões de falha são lesões de cárie secundária, fracturas do dente e da restauração e defeitos marginais.

## INTRODUCTION

During the last two decades, several changes have occurred in the use of restorative materials, as we can also refer an increasing importance of esthetic considerations in posterior teeth restorations. Esthetics is important in restorative dentistry; however, longevity of restorations should be the most important criterion in material selection[1]. Failure of dental restorations is a major concern in dental practice and it has been estimated that replacement of failed restorations constitutes about 60 percent of all operative work[2,3,4]. Such failure

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occurs when a restoration reaches a level of degradation that precludes proper performance, either for esthetic and functional reasons or for the inability to prevent new disease[2].

## METHODS

This study is a review of clinical studies published on the longevity or restorations in stress-bearing posterior preparations and assessing possible reasons for clinical failure. The dental literature was reviewed for longitudinal, controlled clinical studies and retrospective cross-sectional studies of posterior restorations since 1981. Only studies investigating the clinical performance, both longevity and annual failure rate, of Class I and II amalgam and direct composite restorations in permanent teeth were included.

## REASONS FOR RESTORATIVE THERAPY

The patient's age has a significant effect on the main reason for treatment (Table 1)[9]. The majority of restorations in the permanent dentition are first placed at ages between 10 and 20 years old[17]. In young adults (17-29 years old), the most common reason for restorative treatment is primary caries, whereas for patients 30 years old or older, secondary caries, tooth or restoration fracture and loss, are the most frequent reasons for treatment[9].

## REPLACEMENT OF RESTORATIONS

Several studies have reported that secondary caries is the main reason for restoration failure[4,5,6]. Other reasons are tooth or restoration fracture, restoration debonding and marginal leakage[7,8,9,10]. The rate of secondary caries associated with resin-based composite restoration is substantially higher than that associated with amalgam restorations, what can be explained by the presence of an hybrid layer, which inevitably degrades with time; by the polymerization contraction and by the existence of a higher proportion of *Streptococcus mutans* in composite restoration margins which has been revealed by microbiological studies. This occurrence is due to the fact that basic constituents in many resin-based composites, actually encourage the growth of microorganisms (*Streptococcus mutans, Streptococcus sobrinus, Lactobacillus spp*., etc.)[11,12].

On the other hand, although pain and sensibility are not very frequent reasons for replacement of amalgam and composite restorations, it has been observed more frequently in the case of composite restorations[13,14].

According to Bjertness ***et al.***[15], after 17 years, the probability of not replacing an amalgam restoration is as high as 78%, whereas, Rodolpho ***et al.***[16], in the same period of time, have determined a survival rate of approximately 29%, for composite resins (Table 2).

## CARIES RISK

Anusavice[20] suggested that the importance of the restorative material selection varies with caries risk level. In fact Köhler ***et al.***[44] found that the majority of patients with failed restorations by secondary caries or marginal defects carry high counts of potential cariogenic micro-organisms.

As a result of secondary caries, resin-composite restorations have a higher failure rate in comparison to those in amalgam. Indeed, it as been found that the amalgam restorations contain 8 times less microorganisms than composite

| Age of the patient | Reason for restorative treatment | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Primary caries % | Secondary caries % | Lost filling % | Fractures % | Leakage % | Pain % | Aesthetics % | Other % |
| 17-29 years (n = 195) | 54 | 20 | 4 | 10 | 5 | 4 | 3 | 0 |
| 30-39 years (n = 424) | 32 | 27 | 6 | 15 | 5 | 8 | 6 | 1 |
| 40-49 years (n = 820) | 20 | 29 | 10 | 21 | 8 | 5 | 4 | 4 |
| 50-59 years (n = 929) | 18 | 26 | 10 | 24 | 5 | 4 | 4 | 8 |
| 60 years or more (n = 991) | 23 | 27 | 13 | 17 | 5 | 5 | 4 | 6 |
| Total (n = 3434) | 24 | 27 | 10 | 20 | 6 | 5 | 4 | 5 |

**Table 1** - Percentage distribution of the reason for treatment in different age groups (Adapted from Forss e Widström, 2004)[9]

| Reasons for restoration replacement | Previous material | |
|---|---|---|
| | Amalgam (n = 876) % | Composite (n = 1175) % |
| Secondary caries | 41 | 36 |
| Fractures (tooth or restoration) | 22 | 23 |
| Debonding | 10 | 16 |
| Marginal leakage | 7 | 9 |
| Pain/sensitivity | 6 | 5 |
| Aesthetic reasons | 3 | 5 |
| Other (e.g. endodontic reasons) | 11 | 6 |

**Table 2** - Percentage distribution of reasons for replacement of previous restoration (amalgam and composite). (Adapted from Forss e Widström, 2004)[9]

ones. Many authors consider that the need for restoration replacement is positively correlated with the increase in the number of restorations in the mouth and, consequently, with the increase of the caries risk level[18,34].

## ORAL HYGIENE

Currently, direct composite restorations are only indicated when patients have excellent oral hygiene, due to the greater adherence of plaque that occurs on this type of materials[45]. The higher probability of having more plaque adhesion on resin-based materials than in amalgam, calls for even more detailed instructions that have to be given to the patient, regarding oral hygiene, when these materials are selected[1]. Thus, a flawless restoration placement and, simultaneously, appropriate oral hygiene, have a positive effect increasing the longevity of restorations and decreasing their need of replacement[46].

## OCCLUSAL FACTORS

Burke and colleagues found that normal occlusal function is associated with increased restoration's age at replacement; and that excessive and high occlusal function is associated with reduced restoration's age at failure[22].

Amalgam seems to have a greater wear resistance than composite[35,36] and, for patients with heavy occlusion, bruxism or restorations with all occlusal contacts in the restorative material, amalgam, rather than composite, is usually the material of choice. Nevertheless, for most cases with normal occlusal loading and at least some occlusal contacts in tooth structure, resin-composite restorations perform well[15,20,21].

## POSITION IN THE MOUTH

According to Rodolpho *et al.*[16], for resin composite restorations, the survival rate on lower premolars and upper molars is 43% and 37% at 17 years, respectively. The survival rate of upper premolars and lower molars is 24% and 13% at 17 years, respectively. According to this author, the difference between the tooth type is only significant between lower premolars and lower molars. These results are explained by the position of low molars on the dental arch (posterior zone of Spee's curvature), where high occlusion forces exist[37], as well as greater difficulty achieving good field isolation on posterior teeth, yielding lower longevity in resin-based composites placed in low molars.

With respect to amalgam restorations, failures are more often found in premolar teeth (34%) than in molars (27%)[50].

## PREPARATION TYPE

Under optimal conditions, Class I and II amalgam restorations have a median survival time, between 57 and 70 years according to Mitchell *et al.*[10]; 44,1 years according to Gruythuysen *et al.*[47]; 27,6 years according to Smales and Hawthorne[24] and 25 years according to Jokstad and Mjör[5]. However, this good survival time is superior to that observed in general clinical practice, probably because, it is referred to higher quality restorations in highly motivated patients, typically dental students and staff.

On a longitudinal prospective trial (Lucarotti *et al.*.), Class II amalgam restorations were found to have a median survival time of 9,8 years for distal-occlusal (OD) and mesial-occlusal (OD) restorations, and 8,8 years for mesial-occlusal-distal (MOD) restorations [10]. A different long-term (15 years) longitudinal study of posterior restorations corroborates those results, showing that the replacement risk for MOD restorations is significantly higher than for MO/OD restorations [49].

For an amalgam restoration to be successful, it is important to make an appropriate tooth preparation. Due to its physical properties, amalgam must be placed on a tooth preparation that: 1) provides a 90-degree cavosuperficial margin angle (because of its limited shear strength), 2) has a minimum thickness of 0.75 to 2 mm (because of its limited compressive strength with insufficient material thickness) and provides mechanical retention features such as parallel or convergent walls (because of its lack of bonding to teeth) [8,48,49].

Regarding the resin composites, Forss and Widström (9) reviewed the longevity of posterior finding an annual failure rate for Class I and Class II between 0% and 9%. Probability of survival for Class I restorations was 55% and for Class II restorations was 20,2% at 17 years. The relative risk of failure is 2,8 times greater for Class II restorations than for Class I restorations [16].

## PREPARATION SIZE

Even though the average annual failure rate for both amalgam and composite restorations increases as the size and the number of restored surfaces increase, this raise is clearly more accentuated for composite restorations[2]. Regarding the amalgam restorations, it is estimated that 7,5% of small-size restorations; 9,6% of medium-size restorations and 14,2% of large restorations need to be replaced after 5 years. On the other hand, referring to the resin-based composite restorations placed, it is estimated that, after the same period of time, 10,1% of small-size restorations; 11% of medium-size restorations and 19,8% of large restorations have to be replaced[18].

Use of amalgam is preferable on multi-surface restorations in posterior teeth, since the longevity should be the main criterion in the selection of the restorative material[2, 50].For small-size occlusal restorations, some authors recommend greater tooth preservation than amalgam[18] and higher longevity[23].

## FIELD ISOLATION

If the operating site cannot be adequately isolated from contamination by oral fluids, resin composite (or any other bonded material) should not be used [21,42].

The isolation of the operating area for an amalgam restoration, unless it is bonded, is less critical than for composite restorations[18,21].

## TOOTH/RESTORATION INTERFACE

Despite the development of initial infiltration in the margin of an amalgam restoration, the formation of corrosion products gradually saddles the space between the restoration and the tooth, developing a marginal seal that improves with time[39,28]. In contrast, the tooth/restoration interface of resin composite restorations has very different characteristics. The relatively high incidence of secondary caries may be explained by the negative effects of polymerization shrinkage[23,40,41].

## ENAMEL/DENTINE MARGINS

Although the retention of adhesive restorations is no longer a clinical problem, maintaining the margins of adhesive restorations sealed against leakage, remains the major factor that shortens clinical longevity[40]. None of today's bonding systems appear to be able to guarantee leakage-free margins for a significant amount of time, especially at the dentin site[41].

In a study by Köhler *et al.*[44], 13 of the 51 restorations (25,5%) with all margins within enamel have failed compared to 3 of 7 restorations (42,9%) with margins in dentin. In a different study, at 5 years, the success rate of Class II resin composite restorations, the success rate of restorations with margins in dentin was only 57%[43].

The extension to the root surface (without enamel margin) of composite restorations may exhibit gap formation at the junction between the composite and the root, which may be a contraindication for a composite restoration[42]. Any restoration that extends onto the root surface may result in less than ideal marginal integrity [21].

## FREQUENCY OF DENTAL TREATMENTS

Frequently, the criteria for the replacement of restora-

tions are subjective. Sometime, small deviations from ideal concepts determine the replacement, especially in cases where restorations are clinically acceptable with localized defects. When a restoration is replaced, there is a loss of healthy dental tissue, including areas away from the localized defects, thus increasing the preparation and restoration size. The cost of replacing an existing restoration is at least the same as that of the original restoration, and it is probably more costly if indirect restorations are deemed necessary[33].

As restorations are replaced, the preparation becomes increasingly larger, not only because it needs to include recurrent disease, but also because clinicians tend to "freshen up" the margins of preparations regardless of their quality. This increase in size and restoration complexity is a real issue, it is referred by Lutz *et al.*(1987) to as a "countdown" on tooth survival time and it will have a negative long-term effect[17].

## LONGEVITY OF AMALGAM RESTORATIONS

A study comparing of the longevity of various types of amalgam and resin-based restorations, clearly, indicates that amalgam restorations exceed resin-based materials on longevity, in all situations[1,17,18,19].

Amalgam restorations, when compared to resin composites, have low technique sensitivity, high longevity, high radiopacity, high compressive strength, excellent wear resistance, appearance easily distinguished from tooth structure and the ability to seal the marginal spaces over time. The primary disadvantages of amalgam restorations relate to esthetics and the increased tooth structure removal during tooth preparation[51].

According to Kolker *et al.*[22], the estimated median survival time is 22,5 years for amalgam restorations and according to Anusavice[28], a modern dental amalgam can be manipulated, so that the restoration has an average durability of 12 to 15 years. This author argues that approximately 90% of amalgam restorations are functional for over 10 years. Likewise, according to Smales and Hawthorne[24], 78% of amalgam restorations survive more than 5 years, 67% more than 10 years and 48% more than 15 years. Robinson (1971), in a 20 years study, also found an average longevity of 10 years for amalgam restorations[25].

The failures on amalgam restorations, in most cases, are associated with the technical work of the medical practitioner, the dental assistant or the patient behavior, but not with the material. Nonetheless, the amalgam is a material with low resistance to tension and should be handled in view of this deficiency[28].

According to Manhart *et al.*[23], the amalgam annual failure rates ranges between 0% and 7,4% for non-gamma-2 and gamma-2 containing alloys, respectively, with observation periods of up to 20 years (Table 3).

Secondary caries, tooth fracture, cervical overhangs and marginal ditching have been reported as the main problems limiting the survival of amalgam restorations[3,10,23].

## LONGEVITY OF DIRECT COMPOSITE RESTORATIONS

The main reasons for composite restorations failure are secondary caries and fracture of the restoration[26].

Resin composite restorations, when compared to amalgam restorations, are more esthetic, preserve tooth structure (less extension; no need for uniform depth; mechanical retention usually not necessary) and have low thermal conductivity[20]. Moreover, the resin composites require a meticulous operative procedure, unlike amalgam, to achieve a greater likelihood of long-term success. Nevertheless, its low durability in posterior teeth constitutes its main disadvantage[27]. In a study by Bernardo *et al.* [2], the overall risk of failure due to secondary caries was 3,5 times higher in composite restorations than in amalgam restorations. Collins *et al.* [29] reported that composite restorations fail at a rate two to three times higher than that of amalgam restorations (5,8%) after 8 years of observation. These results were confirmed years later by Opdam *et al.* [30], who refer a median survival time of 3,3-4,7 years for resin composite and 6,6-14 years for amalgam.

In studies looking on the longevity of composite restorations in posterior teeth, survival rates were between 55% and 95% during an observation period of 5 years[31]. In a meta-analysis of 16 long-term clinical studies of posterior composite restorations, it was calculated that after 5 years of clinical service, 84% of the restorations remained clinically acceptable[32].

## DISCUSSION

The performance of dental restorations is influenced by several factors, including the restorative materials used, the clinician's level of experience, the type of tooth, the tooth position in dental arch, the restoration design, the restoration size, the number of restored surfaces and the patient's age. Although several studies have been published on the longevity of amalgam and composite restorations, most are difficult to

| First Author | Year | Observation Period (years) | Black Class | Nr of Restorations | Nr of Patients | Survival Rate (%) | Annual Failure Rate (%) | Median Survival Time (years) |
|---|---|---|---|---|---|---|---|---|
| Allan | 1969 | 10 | I e II | 78 - 92 | | 54 - 39 | 4,6 - 6,1 | |
| Robinson | 1971 | 20 | I e II | 145 | | 22,8 | 3,9 | 10 |
| Lavelle | 1976 | 20 | I e II | 6000 | | | 4,8 | |
| Allan | 1977 | 20 | I e II | 148 | | 14 | 4,3 | 8 |
| Crabb | 1981 | 10 | I e II | 269 - 530 | | 59,5 - 37,2 | 4,1 - 6,3 | >10 - 8 |
| Paterson | 1984 | 15 | I e II | 854 e 190 | | | | 8 e 7 |
| Letzel | 1989 | 5-7 | I | 2341 | | 88 - 91 | | |
| Welbury | 1990 | 5 | I | 150 | 103 | 92,7 | 1,5 | |
| Jokstad | 1991 | 7-10 | II | 256 | 141 | 73,5 | 2,7-3,8 | |
| Osborne | 1991 | 14 | I e II | 367 | 40 | 87,2 | 0,9 | |
| Pieper | 1991 | 9 - 11 | I e II | 129 - 413 | | 85,3 | 1,3 - 1,6 | |
| Smales | 1991 | 18 | I e II | 1801 | | 70 | 1,7 | |
| Smales | 1991 | 15 | II | 768 | | 72 | 1,9 | |
| Jokstad | 1994 | >10 | I e II | 803 - >3000 | | | | 14 - 7-11 |
| Smales | 1996 | 15 | II | 160 | | 47,8 | 3,5 | |
| Wilson | 1996 | 5 | I e II | 172 | | 94,8 | 1 | |
| Hawthorne | 1997 | | I e II | 1371 | | | | 22,5 |
| Letzel | 1997 | 13 | I e II | 3119 | | 85 | 1,2 | |
| Martin | 1997 | 5 | II: 4faces<br>II: 5faces | 2038<br>1626 | | 72<br>65 | 5,6<br>7 | |
| Mjör | 1997 | >25 | I e II | 282 | | | | 9 |
| Roulet | 1997 | 6 | I e II | 163 | 43 | 87,5 | 2,1 | |
| Smales | 1997 | 5<br>10<br>15 | II | 160 | | 77,6<br>66,7<br>47,8 | 4,5<br>3,3<br>3,5 | 14,6 |
| Kreulen | 1998 | 15 | II | 1117 | 183 | 83 | 1,1 | |
| Plasmans | 1998 | 8 | II | 266 | 130 | 88 | 1,5 | |
| Burke | 1999 | | I e II | 268 - 1142 | | | | 7,4 - 6,6 |
| Cichon | 1999 | 8 | 1 face<br>2 faces<br>3 faces | 820 | | 80<br>73,2<br>71,1 | 2,5<br>3,4<br>3,6 | |
| Kamann | 1999 | 6 | I e II | 62 - 21 | | 83,9 - 66,7 | 2,7 - 5,6 | |
| Summitt | 2001 | 5 | II | 21 - 19 | 28 | 90,5 - 63,2 | 1,9 - 7,4 | |
| Van Nieuwenhuysen | 2003 | | I e II | 722 - 115 | | | | 12,8 - 7,8 |
| Bernardo | 2007 | 7 | I e II | 856 | 472 | 94.4 | 0.82 | |

**Table 3** - Longevity of amalgam restorations in posterior teeth. (Adapted from Manhart *et al.*, 2004)[23]

compare because they diverge on the: 1) number of patients, 2) years of follow-up, 3) definition of failure, 4) number of clinicians evaluating treatment and their level of experience, 5) number of restorations per patient, 6) type and size of restorations and finally, 7) the type of statistical methods used.

Besides their great longevity, amalgam restorations have a simple technique and are very versatile. In contrast, composite restorations have several limitations as their short longevity, higher cost, higher technique sensitivity, as well as a more time consuming. For those reasons, most likely amalgam restorations will continue to be used very often. The use of amalgam as a restorative material is especially indicated in situations such as: 1) presence of extensive caries lesions; 2) posterior teeth, especially those affected by high occlusion forces, 3) difficulties isolating the operative field, 4) sub-gingival/dentin preparations, and finally, 5) high caries risk patients.

The zinc and copper content of the alloy has been found to have a strong impact on the survival rates of amalgam

| First Author | Year | Observation Period (years) | Black Class | Nr of Restorations | Nr of Patients | Survival Rate (%) | Annual Failure Rate (%) | Median Survival Time (years) |
|---|---|---|---|---|---|---|---|---|
| Wilson | 1988 | 5 | I e II | 67 | | 86 | 2,8 | |
| Moffa | 1989 | 5 | I<br>II | 56 | | 80<br>55 | 4<br>9 | |
| Welbury | 1990 | 5 | I | 150 | 103 | 94,7 | 1,1 | |
| Barnes | 1991 | 5<br>8 | I e II | 33 | 12 | 90<br>77 | 2<br>2,9 | |
| Mjör | 1993 | 5 | II | 1 | | 85 | 3 | |
| El-Mowafi | 1994 | 5 | I e II | 191 | | 89,5 | 2,1 | |
| Jokstad | 1994 | >10 | I<br>II | 22<br>79 | | | | 4<br>4-7 |
| Geurtsen | 1997 | 4 | I<br>II | 109<br>1100 | 412 | 87 | 3,3 | 9 |
| Mjör | 1997 | >25 | | 537 | | | | 6 |
| Helbig | 1998 | 5 | I e II | 27 | 22 | 88,9 | 2,2 | |
| Mair | 1998 | 10 | II | 56 | | 92,9 | 0,7 | |
| Collins | 1998 | 8 | I e II | 52 | 46 | 94,2 | 0,7 | |
| Mertz-Fairhurst | 1998 | 10 | I | 85 | | 80 | 2 | |
| Nordbo | 1998 | 7 | II | 34 | 37 | 88 | 5,9 | |
| Lundin | 1999 | 5<br>10 | I e II | 61 | 65 | 88,5 | 2,3 | |
| Raskin | 1999 | 10 | I e II | 100 | 36 | 50-60 | 4,5 | |
| Wilder | 1999 | 17 | I e II | 85 | 33 | 76 | 1,4 | |
| Raskin | 2000 | 10 | I e II | 60 | | 46,7 | 5,3 | |
| Van Djiken | 2000 | 11 | II | 96 | 40 | 82,3 | 1,6 | |
| Gaengler | 2001 | 10 | I e II | 62 | | 74,2 | 2,6 | |
| Pallesen | 2003 | 11 | II | 27 | 27 | 89 | 1 | |
| Türkün | 2003 | 7 | I e II | 23 | 38 | 95,7 | 0,6 | |
| Van Djiken | 2003 | 6 | I | 41 | 29 | 97,6 | 0,4 | |
| Bernardo | 2007 | 7 | I e II | 892 | 472 | 85.5 | 2.21 | |

**Table 4** - Longevity of direct composite restorations in posterior teeth. (Adapted from Manhart *et al.*, 2004)[23]

restorations, as it influences the corrosion resistance of the amalgam. High-copper amalgams have higher survival rates than conventional amalgams.

Secondary caries is the main reason for failure in both amalgam and composite restorations. Amalgam restorations perform consistently better than composite restorations, independently of the type of tooth, number of restored surfaces or size of the restoration. It is frequently stated in earlier studies that the operator mistake is responsible for most of the amalgam restorations failures, either due to faulty cavity preparation or to the incorrect handling of the material.

On the other hand, marginal deterioration of composite restorations remains problematic and is the major reason for the short lifetime of these adhesive restorations. The onset of caries lesions adjacent to composite restorations is earlier than that of caries adjacent to amalgam restorations because some composite components have the ability to promote bacterial growth. Despite some disadvantages, it is important to note that use of resin composite in small preparations, allows a great preservation of tooth structure.

Regarding both materials, the fail rate is higher on Class II than on Class I restorations, and the larger restorations show also a smaller longevity when compared to small/medium size restorations.

## CONCLUSIONS

Despite variations in the studies and lack of parameter standardization, it can be concluded from the literature that correctly performed amalgam restorations in posterior teeth have higher longevity when compared with resin composite, regardless the tooth type, the number of restored surfaces or the restoration size.

These differences on longevity are more evident in large restorations when multiple surfaces are involved.

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