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REVIEW ARTICLE

The elastomers for complete denture impression: A review of the literature

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Abstract This article reviews the current trends in materials used for complete denture impression. Peer-reviewed articles, published in English and in French between 1954 and 2007, were identified through a MEDLINE search (Pubmed and Elsevier) and a hand search of relevant textbooks and annual publications. Emphasis was made on the characteristics of the elastomers, their manipulation, the different techniques used, and the quality of the impression obtained. The combination of excellent physical properties, handling characteristics, and unlimited dimensional stability assures the popularity of these impression materials.

Contents

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1. Introduction

An impression is a record, a facsimile of mouth tissues taken at an unstrained rest position or in various positions of displacement (Devan, 2005). In the case of an edentulous arch, this requires a unique combination of managing movable soft tissue commensurate with integrating different materials and a technique for accurate reproduction. (Appleby, 1954; Zarb et al., 1985; Kois and Fan, 1997; Petrie et al., 2005). The history of complete denture impression procedures has been influenced largely by the development of impression materials from which new ideas and techniques arose. Some impression materials have been developed to accomplish specific goals and, at the time at least, were considered desirable for the purpose (Starcke, 1975; Zinner and Sherman, 1981; Zarb et al., 1985). The materials available for impression tray construction are as varied as are the materials for border molding and the final impression. Selection of material is left to the discretion of the dentist, who makes choices based on personal preference and experience. More important than selection of material is the dentist's complete understanding of the concepts and principles in impression making (Zarb et al., 1985; Lang, 1994; Boucher, 2004; Petropoulos and Rashedi, 2005; Al-Ahmad et al., 2006). The manner in which the impression was made may be more important than the material (Firtell and Koumjian, 1992; Ivanhoe et al., 2002).

In the last decade, several investigators have recommended using newer elastomeric materials such as polyvinylsiloxane and polyether for final impressions to replace the older and more traditional materials (Chee and Donovan, 1992; McCord et al., 2005; Petrie et al., 2005). Four basic types of elastomer impression materials are currently in use in the dental profession: (1) silicone rubbers which polymerize by a condensation reaction, (2) polysulfide (mercaptan) rubbers, (3) polyethers, and (4) silicones which polymerize an addition reaction. The latter have been introduced relatively recently and are also called polyvinylsiloxanes (Lacy et al., 1981).

The purpose of this article was to review the characteristics of these materials that enhance their wide use in the complete denture final impression. Peer-reviewed articles published in English and in French between 1954 and 2007, were identified through a MEDLINE search (Pubmed and Elsevier) and a hand search of relevant textbooks and annual publications.

2. Current trends (surveys)

Patient studies demonstrate that millions of individuals without complete dentitions will require prosthodontic treatment well into the 21st century (Burton, 2000; Petropoulos and Rashedi, 2005). A recent review found that most patients are satisfied with the performance of conventional mucosal-borne complete dentures (Donovan et al., 2007).

Techniques and dental materials in complete denture prosthodontics (CDP) have not changed greatly in the last 45 years (Arbree et al., 1996). Most private practitioners have continued to use the denture fabrication methods which they learned in dental school, although often they modify their impression techniques to reflect the use of newer, more efficient materials. Improved efficiency in the denture fabrication process is important to most clinicians (Burton, 2000).

Differences are noticeable between the materials and methods currently used by dentists for final impressions in complete denture prosthodontics.

Even though the current generation of impression materials provides alternatives, making an initial impression still can be difficult when patients have significant resorption (Pyle, 1999). The concept of molding the periphery of a complete denture prosthesis to the surrounding musculature has been accepted and taught for about 75 years (Zinner and Sherman, 1981; Troendle and Troendle, 1992; Academy of Prosthodontics, 1995; Pyle, 1999; Drago, 2003). Anecdotal evidence suggests that the impression techniques used in general dental practice may vary from those taught at dental schools (Hyde and McCord, 1999; Burton, 2000; Duncan and Taylor, 2001; Drago, 2003).

A 1977 survey reported that zinc oxide/eugenol paste was the most popular material for final impressions for complete dentures, followed by polysulfide, for both general dentists and prosthodontists in practice (Harrison, 1977). Earlier, Surila and Nakki compared opened and closed-moth techniques that used silicone impression material. They concluded that the open-mouth technique was more likely to achieve good results than the closed-mouth technique in border molding with a high viscosity silicone material (Surila and Nakki, 1972). In 1973, Solomon used silicone materials for complete denture impressions: a high viscosity material for border molding and a low viscosity material for secondary impression. He concluded that the silicone impression material was preferable to the conventional low-fusing impression compound (Solomon, 1973). Another survey, in 1984, showed that only 30% of restorative dentists collectively (general dentists and prosthodontists) used a border-molded custom tray, 30% used a custom tray without border molding, and 30% used alginate in a stock tray for final impression (Taylor et al., 1984).

Because the fixed prosthodontic impression materials do not fulfill the requirements for CDP and/or because manufacturers' instructions are for fixed prosthodontic use, some clinicians continue to use older complete denture prosthodontics impression materials (i.e. polysulfide rubber [PR]). Others continue to use the newer materials, but without the research in the technique to optimize the results (Arbree et al., 1996; Hyde and McCord, 1999). Surveys published among British clinicians concluded that alginate remains the impression material of choice (Harrison et al., 1990; Hyde and McCord, 1999; Drago, 2003). Other materials mentioned as an option for secondary impressions included zinc oxide-eugenol and polyvinylsiloxane (Hyde and McCord, 1999; Drago, 2003). Many schools were trying a variety of final impression materials, including ZOE, PVS, injectable alginate, condensation silicone, and fluid wax (Drago, 2003). German dentists preferred an elastic impression material for functional impressions (Genieser and Jakstat, 1990). For others, cake compound remains, in 1999, useful for making accurate impressions in difficult cases involving resorption (Pyle, 1999). In the same year, Sharry recommended secondary impressions with zinc oxide-eugenol and a spaced tray (Pyle, 1999). Nassif, in 1984, has concluded that a polysulfide rubber base material is the material of choice for reline impressions (Nassif and Jumbelic, 1984). Describing five specialized techniques for definitive impressions, McGregor and Fen used four materials. In his modified definitive impression technique, Duncan deliberately overextended irreversible hydrocolloid impressions for fabrication of master casts. Recently in 2003, Chaffee et al. reported the use of vinyl polysiloxane impression material to border-mold custom impression trays (Drago, 2003). Massad, in 2005, proposed the use of polyvinylsiloxanes for improving the stability of maxillary dentures (Massad et al., 2005).

Newer "quadrafunctional" addition-reaction silicone materials (Aquasil, Dentsply Caulk) make impression-making easier but in no way compensate for a lack of knowledge or attention to detail. The art of impression-making still requires skill, practice and understanding of the oral anatomy being impressed (Burton, 2000).

A brief mail survey of North American dental schools was undertaken in 1994 to ascertain the current techniques in complete denture prosthodontics. 81% of the schools said that they only used modeling plastic impression compound for border molding the final impression tray, while 7% used only polyether impression material. Forty-eight percentage used only PR (polysulfide rubber), 22% used only "other" (not PR or polyether), and 4% used only polyether impression materials for their final impression "wash" (Arbree et al., 1996). The use of PR was still as popular in 1994 as it was in 1985 (Jaggers). There has been a decrease in the use of ZOE, mentioned only 29% of the schools (Jaggers et al., 1985). In the 1969 survey, zinc oxide-eugenol (ZOE) was the most popular (85%) final impression material in the responding schools (Levin and Sauer, 1969). Only one school teaches the use of wax as an impression material, and then only for the mandibular impression. The number of schools exclusively using modeling plastic impression compound for border molding is decreasing (96% in 1985 to 81% today) (Jaggers et al., 1985).

In 2001, a survey of US dental schools was conducted in the predoctoral clinical curriculum. The most popular impression material, used by 39% of the schools, is polysulfide. This represents a decline in polysulfide's popularity from the 1993 survey (Arbree et al., 1996). The choice of impression material(s) used today in dental schools shows how schools are moving toward newer materials and techniques and away from traditional materials, such as polysulfides and ZOE (Petropoulos and Rashedi, 2005).

Another anonymous questionnaire, in 2003, confirmed that the majority of the reporting prosthodontists (88%) and dental schools (98%) use a border-molded custom tray for final impressions for complete denture prosthodontics. The most popular material for border molding was a plastic modeling compound. Variability of the materials used for final impressions was observed, with the most popular materials being polyvinylsiloxane for the ACP members (36%) and polysulfide for the dental schools (64%). Distinct trends for increasing use of polyvinylsiloxane and polyether for border molding procedures and impressions of edentulous arches were observed both in members of the ACP and in the US dental schools (Petrie et al., 2005).

3. Clinical implications

3.1. Mixing

Despite all the advantages that elastomeric materials possess, a thorough understanding of the composition, physical properties, and manipulative variables of these materials is essential to achieve predictable success (Chee and Donovan, 1992). They are well suited for making complete denture impressions (Levin and Sauer, 1969), and have simplified restorative procedures compared to inelastic materials (Smith et al., 1979; Burton, 2000; Johnson et al., 2003). The material is available in automatic mixing systems, so it can be easily and evenly applied on the tray borders, with one insertion of the tray (Smith et al., 1979; Phoenix and DeFreest, 1997). Good results are obtained with less expenditure of time as well as less discomfort and inconvenience for the patient, even in the hands of an inexperienced operator (Appelbaum and Mehra, 1984; Loh, 1997; Duncan and Taylor, 2001). Compared to hand mixing, both automixing and electronic mixing techniques enhance the quality of a definitive impression. Also, automixing was considered to be more economical than hand mixing because it wastes one third less volume of material as compared to hand mixing (Chee and Donovan, 1992; Lepe et al., 2002; Hayakawa and Watanabe, 2003; Nam et al., 2007).

3.2. Custom tray

The silicone, polysulfide rubber, and polyether impression materials can record the shape of soft tissues accurately if they are adequately supported by an accurately fitted tray (Williams et al., 1984; Zarb et al., 1985; Gilbert and Blandin, 1991; Chee and Donovan, 1992). Greater accuracy was obtained in custom trays than with impressions made in stock trays. The bulk of elastomeric impression material and size of the undercut are of major importance (Custer et al., 1964; De Araujo and Jorgensen, 1985). They can guarantee accurate adaptation to the tissues without injurious displacement (Appleby, 1954; Javid et al., 1985). These materials are characterized by low stiffness and extremely large elastic strains (Glossary of prosthodontic terms, 2005). Accuracy and consistency are best maintained by the use of custom tray and adhesives to retain polyvinylsiloxanes (Lacy et al., 1981; De Araujo and Jorgensen, 1985; Zarb et al., 1985; Boucher, 2004; Duncan et al., 2004). Inaccurate casts would result from lowered adhesive strength (Nishigawa et al., 1998). Polyether rubber is intermediate in stability to polysulfide or silicone systems and polyvinylsiloxane when impression techniques involve adhesive bonding to custom-formed trays (Lacy et al., 1981). The polysulfide rubbers must be closely confined to the soft tissues (Zarb et al., 1985). The polyether impression materials have sufficient body to make up discrepancies between tray borders and the reflecting vestibular tissues of up to 4 or 5 mm, they can be shaped by the fingers. It appears that it is the material of choice for the optimal recording of the functional periphery seal in maxillary full dentures (Zarb et al., 1985; Naser and Postaire, 1991; Felton et al., 1996).

3.3. Dimensional change

In the dental practice, pouring of the impression is often delayed due to time constraints, and the majority of impressions are sent to a commercial laboratory for pouring (Harrison et al., 1990; Petrie et al., 2005). It has been shown that dental practitioners may delay pouring impressions up to 72 h. Therefore, practitioners should be aware of the tolerable time delay for which the selected impression material will remain dimensionally accurate (Petrie et al., 2005). With these materials, the dimensional accuracy is usually time dependent, i.e. the material may display great dimensional accuracy soon after its polymerization is complete, but is dependent on the material, and varying degrees of accuracy have been reported after the impressions have been stored for a period of time (Custer et al., 1964; Petrie et al., 2005). Early generations of VPS impression materials released hydrogen gas after setting, which required a delay in the pouring of casts to avoid bubbles. This problem has been resolved by adding platinum or palladium to scavenge the gas, and this improvement has allowed the immediate pouring of casts without bubbles or voids (Lepe et al., 2002; Nam et al., 2007). The American Dental Association Specification No. 19 states that such elastomers should shrink no more than 0.5% over a 24 h period (Lacy et al., 1981).

In general, polyether and polyvinylsiloxane impression materials remain dimensionally accurate for a prolonged period of time (up to 1 week) (Christensen, 1984; Chee and Donovan, 1992; Petrie et al., 2005). The condensation-silicone systems should be poured as soon as possible after making the impression (Lacy et al., 1981). VPS impression materials demonstrate excellent accuracy, and the fewest dimensional changes after multiple pours (Lacy et al., 1981; Nissan et al., 2000; Nam et al., 2007). The absence of volatile reaction products such as water or alcohol which are normally produced by the polysulfides and condensation-curing silicones during setting enhance the stability of the polysiloxane silicone materials. The latter cure by means of an addition reaction. The loss of these products can produce significant shrinkage of the material. Small dimensional changes with time were reported with the polysiloxane materials when compared with the polysulfides and the condensation-curing silicones. Their stability is comparable to that of the polyethers, except that if the polyethers are stored in contact with moisture, swelling may occur with an accompanying loss of accuracy. The polyether material Impregum expanded during storage (Lacy et al., 1981; Christensen, 1984; Williams et al., 1984; Nissan et al., 2000). In contrast, polysulfide impression materials have acceptable dimensional accuracy only if poured immediately (Williams et al., 1984), or within approximately 1–2 h after the impression is made (Petrie et al., 2005). Bonded to custom trays, they show a progressive increase in die diameter with time. Dies produced from polysulfides over a 4-day period seem no more or less accurate then dies produced from condensation silicones impressed by the same mode (Lacy et al., 1981).

3.4. Hydrophilic behavior

There are also definite differences in the hydrophilic behavior of the most popular elastomeric materials that are used for final impressions for complete dentures. The original disadvantage of using VPS impression materials was their hydrophobic characteristics, producing an adverse effect on the surface quality of the polymerized impressions (Utz et al., 2004; Nishigawa et al., 1998; Burton, 2000; Nissan et al., 2000; Duncan and Taylor, 2001; O'Callaghan, 2001; Johnson et al., 2003; Wright, 2004; Petrie et al., 2005). The hydrophobicity can be explained by the material's chemical structure, which contains hydrophobic, aliphatic hydrocarbon groups surrounding the siloxane bond (Petrie et al., 2005). The presence of moisture has been reported to result in impressions with voided and/or pitted surfaces and inferior detail reproduction (Burton, 2000; Johnson et al., 2003), even with the newer "hydrophilic" polyvinylsiloxane presently available on the market (Johnson et al., 2003). Surfactants applied to the impression material, like polyether carbosilane (PCS) (Nam et al., 2007), significantly reduced the number of voids in artificial stone casts, as did the modified elastomers designated by the manufacturer as hydrophilic (Norling and Reisbick, 1979; Cullen et al., 1991; Petrie et al., 2003; Lu et al., 2004; Butta et al., 2005). The choice of the most effective surfactant is critical and differs not only between the types of elastomer, but also between the brands of a single type. The beneficial effect of the optimal surfactant is not reduced by rinsing the impression prior to pouring. While the working time of silicone is increased by surfactant additions, that of the polysulfide is essentially unaffected, as are the dimensional accuracies and permanent deformations of both materials (Norling and Reisbick, 1979). This allows the material to be in more intimate contact with tissues with the aim of capturing better surface detail and fewer defects (Johnson et al., 2003). While these "hydrophilic" polyvinylsiloxane impression materials are associated with improved wettability of the polymerized impression with dental gypsum slurries, these materials produce impressions with clinically acceptable surface characteristics only under dry conditions (Johnson et al., 2003; Petrie et al., 2005).

Since oral mucosal tissues contain both the major and minor salivary glands, it is very difficult to attain or maintain a dry field when making impressions to capture the mucosal details of the edentulous arches (Petrie et al., 2005). When using polyvinylsiloxanes, moisture control remains a critical factor for the predictable success of the clinical impression. However, polysulfide and polyether impression materials, because of their more hydrophilic nature, should be more compatible with the inherent moisture of the edentulous arch mucosal tissues (Firtell and Koumjian, 1992; Petrie et al., 2005). Even though there is a need to control the salivary secretions when making impressions with polysulfide rubber (Firtell and Koumjian, 1992). Polyether produced the best detail under moist conditions (Johnson et al., 2003; Walker et al., 2005; Allen et al., 2006). The hydrophilic structures present in the polyether impression material are represented by carbonyl (C═O) and ether (C–O–C) groups, while polysulfide impression material contains hydrophilic disulfide (–S–S–) and mercaptan groups (–S–H). The chemical structures containing available functional groups attract and interact with water molecules through hydrogen bonding (Petrie et al., 2005).

The monophase technique whether polyether or vinyl polysiloxane generally produced better detail under either wet or dry conditions compared to the dual-viscosity technique. However, others found that monophase impressions produce more voids than 2-phase impressions (Johnson et al., 2003).

In conclusion, the results among the investigators have been variable, but there is agreement in the relative order of increasing hydrophilicity for elastomeric impression materials; silicone is less hydrophilic than polysulfide, which in turn is less hydrophilic than polyether (Pratten and Craig, 1989).

3.5. Soft tissue detail

An impression of an edentulous area is a negative reproduction of tissue positions recorded at the moment of setting of the impression material (Firtell and Koumjian, 1992). Surface detail reproduction has also improved with the evolution from reversible hydrocolloid (agar) to polysulfide, then condensation silicone, and finally to polyether and vinyl polysiloxane materials (Johnson et al., 2003).

Polyether and hydrophilic addition silicone produced casts with more soft tissue detail than low-viscosity polysulfide or ZOE (Pratten and Novetsky, 1991; Petrie et al., 2005), even though ZOE records accurate surface detail (Zarb et al., 1985). This disparity is difficult to explain because the wettability of the materials is similar. The difference could be explained by one or more of the following: shear thinning effects, amount and size of filler particles, extent of initial cross-linking, and compatibility of gypsum and impression material (Pratten and Novetsky, 1991). The correct amount of flow necessary to obtain an impression is not known. A thin material is more easily placed, but is more difficult to contain. The flow of polysulfide rubber may increase the detail, but some authors question the need for precise surface detail for retention of a mandibular denture. Close adaptation to the tissue is usually considered necessary to increase retention and stability, but there may be a fine line where optimum adaptation ends and the pressure begins. The degree of detail that needs to be recorded by an impression for a complete denture has never been established (Pratten and Novetsky, 1991; Firtell and Koumjian, 1992). However, since viscosity is controlled and an adequate flow is maintained during seating in the mouth, mucosal detail is superior (Hayakawa and Watanabe, 2003). The polysulfide rubbers are particularly useful for making impressions for thin high mandibular ridges with soft-tissue undercuts. The elasticity of the rubber and its tear strength, which is higher than silicone or polysulfide materials, allow the impression to be removed from the cast without fracture of the delicate ridge on the cast (Zarb et al., 1985). It is also important to notice that elastomeric materials demonstrate elastic recovery from undercuts (De Araujo and Jorgensen, 1985; Nissan et al., 2000; Nam et al., 2007).

3.6. Viscosity

Viscosity is one of the factors that influence surface detail reproduction. There appears to be a direct relationship between the viscosity of the impression material and the amount of pressure placed on the mandibular ridge during impression making. The tested materials can be categorized into two groups: a group that produced high pressure, which included irreversible hydrocolloid and medium body vinyl polysiloxane, and a group that produced low pressure, which included light body polysulfide and light body vinyl polysiloxane. As the viscosity of the material increased, the pressure exerted upon the mandible increased as well. A tray that had 2 mm relief or holes, or both, produced less pressure than one with no relief and no holes, especially for high pressure impression materials (Minagi et al., 1988; Masri et al., 2002; Komiyama et al., 2004; Al-Ahmad et al., 2006). The use of light body polysulfide or light body vinyl polysiloxane is recommended for making edentulous impressions (Burrell et al., 1991; Masri et al., 2002; Al-Ahmad et al., 2006). However, it has been found that statistically significant differences in the flange form measurement distances among the different materials and method of application of the materials (Karlsson et al., 1979; Fitzloff, 1984). The fact that they produce the lowest pressure is important in the production of accurate impressions of minimally displaced mucosa. This will help in the fabrication of dentures that have proper retention, stability, and support. It is important to emphasize on the notion that medium and high-viscosity impression materials, though containing more filler particles, can function as low-viscosity materials when mixed mechanically (Al-Ahmad et al., 2006). For some authors, however, zinc oxide paste is still the final impression material of choice in most instances (Weng and Khlevnoy, 1995).

3.7. Type IV gypsum compatibility and wettability

Differences in dimensional stability, wettability, and surface hardness have been identified for gypsum casts poured against various elastomeric impression materials (Panichuttra et al., 1991). The American National Standards Institute and American Dental Association (ANSI/ADA) Specification No. 19 specifies the use of an unmodified, a-hemihydrate gypsum in determining whether an impression material is compatible with dental stones. If a 20-mm-wide line in the surface of an impression material specimen is reproduced in the gypsum cast at between 34 and 312 magnification, the impression material has satisfied the "compatibility with gypsum" requirement (American Dental Association, 1977). The hydrophobic characteristics of addition-reaction silicone impression materials, mentioned earlier, make it difficult to pour a bubble-free stone cast (Norling and Reisbick, 1979).

Although some studies have reported on the compatibility between combinations of impression materials and dental stones (Gerrow and Schneider, 1987; Butta et al., 2005), a lack of surface detail reproduction on the die is one manifestation of a compatibility problem. Not all addition-reaction silicone impression materials tested were compatible with all of the Type IV gypsum products used in this study (Butta et al., 2005). Some materials did reproduce detail on the impression surface but failed to transfer the detail to the cast (Gerrow and Schneider, 1987; Lepe et al., 1998). The incorporation of certain nonionic surfactants into silicone and polysulfide elastomers increases their wettability by gypsum products and consequently results in less bubble entrapment in poured casts (Norling and Reisbick, 1979). Adding that mixing technique does not play a role in the wettability (Lepe et al., 1998).

3.8. Disinfection

Disinfection procedure recommendations have changed throughout the years on the basis of research and technique effectiveness. Long-term immersion has been shown to alter the accuracy of both polyether and VPS. Recommendation has been made that these materials be only spray disinfected to avoid imbibition and dimensional changes (Johnson et al., 1988). Impression materials have since been changed (Wadhwani et al., 2005). Studies demonstrated that impression material accuracy was unaffected by immersion disinfection if the recommended time of disinfection is used. Overall accuracy of polyether and addition silicone materials stayed acceptable (Kern et al., 1993; Abado et al., 1999; Lepe et al., 2002; Wadhwani et al., 2005). Linear dimension variations after disinfection were clinically insignificant (Lagenwalter et al., 1990).

3.9. Post-insertion adjustments

In order to demonstrate the superiority of new materials and techniques on traditional procedures, some authors compare the number of post-insertion appointments required. They found no significant difference (Firtell and Koumjian, 1992; Troendle and Troendle, 1992).

4. Discussion and conclusions

MEDLINE, Elsevier, and hand searches were conducted for articles on selected aspects of impression materials and techniques for complete dentures with a focus on the best available evidence. If publications of the highest levels, i.e. clinical randomized controlled trials (RCT) and systematic reviews of RCTs, were not available, other studies were considered.

Most textbooks advocate a two-stage procedure: (1) preliminary impression, often with an irreversible hydrocolloid (alginate) in a stock tray; and (2) final impression in a custom tray usually made of acrylic resin. There are many materials for the final impression, such as gypsum, zinc oxide and eugenol (ZOE) paste, polysulfide rubber, polyether, polyvinyl siloxane, and alginate. Preferences vary much among dentists. However, there is no evidence that one technique or material produces better long term results than another.

Many general practitioners use a single alginate impression as the definitive impression for the construction of complete dentures, which conflicts with the teaching in practically all dental schools. It is, therefore, of interest that an RCT found neither patient-assessed nor dentist-evaluated differences between dentures fabricated according to a traditional or a simplified method. The simple technique used alginate in a standard tray for the definitive impression, whereas the traditional technique included an individual tray with border molding and polyether for the final impression (Kawai et al., 2005). Although impression materials differ in many aspects and a variety of techniques exist in taking the impressions, there is no evidence to conclude that the clinical long-term outcome of dentures fabricated using varying materials and methods would differ significantly. These and other aspects of variation in methods and techniques are discussed in a review of an evidence base for complete dentures (Carlsson, 2006).

We should recognize that a variety of dental impression materials are still currently being used. The majority of which originated for use in non-dental-related fields. The elastomers were developed as an alternative to natural rubber during World War II. These materials have since been modified chemically and physically for use in dentistry. Initially, this group consisted exclusively of polysulfide impression materials. Subsequently, condensation-cured silicones were developed. Today, two of the most popular elastomers used in dental practice are the polyethers and addition-reaction silicones, or vinyl polysiloxanes (Wadhwani et al., 2005).

The popularity of the elastomer materials is understandable, given the combination of excellent physical properties, handling characteristics, and unlimited dimensional stability (De Araujo and Jorgensen, 1985). Polyvinylsiloxane putty and light-body impression material are well suited for making complete denture impressions. Obviously, good results are obtained with less expenditure of time as well as less discomfort and inconvenience for the patient, especially in the hands of an inexperienced operator (Lu et al., 2004). In addition, the odor, taste, and color of the polysiloxane materials give them good patient acceptability. The dentist appreciates the ease with which they can be used (Komiyama et al., 2004).

In conclusion:

(1) Distinct trends for increasing use of polyvinylsiloxane and polyether for border molding procedures and impressions of edentulous arches were observed. They are well suited for making complete denture impressions.
(2) The manner in which the impression was made may be more important than the material.
(3) Greater accuracy was obtained in custom trays than with impressions made in stock trays.
(4) The material can be easily and evenly applied on the tray borders with one insertion of the tray. They demonstrate excellent accuracy, and the fewest dimensional changes after multiple pours.
(5) There is agreement in the relative order of increasing hydrophilicity for elastomeric impression materials; silicone is less hydrophilic than polysulfide, which in turn is less hydrophilic than polyether.
(6) Polyether and hydrophilic addition silicone produced casts with more soft tissue details than low-viscosity polysulfide or ZOE.
(7) Polyether rubber is intermediate in stability to polysulfide or silicone systems and polyvinylsiloxane.
(8) Not all addition-reaction silicone impression materials tested were compatible with all of the Type IV gypsum products used in this study. Some materials did reproduce detail on the impression surface but failed to transfer the detail to the cast.

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