Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Index Copernicus value = 85.10

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Review Article

Evolution on Complete Dentures: A Review

Pragya Bali[1], Pratibha Sharma[2], Natasha Bathla[3], Tanmay Kaprate[4], Harsh Bali[5], Shivangi Bali[6]

1. Medical officer (Dental) Civil Hospital Sundernagar, Pungh, Himachal Pradesh, India.
2. Post Graduate Student, Dept. of Prosthodontics, Himachal Dental College, Sundernagar, Mandi, Himachal Pradesh, India
3. Post Graduate Student, Dept. of Prosthodontics, Himachal Dental College, Sundernagar, Mandi, Himachal Pradesh, India
4. Medical officer (Dental), C.H.C Kotkhai, Shimla, Himachal Pradesh, India
5. Medical officer (Dental) BBMB Hospital Sundernagar, Himachal Pradesh, India
6. Graduate Student, English and Phycology, Mehr Chand Mahajan DAV College, 177 sector 36a, Chandigarh, India

ABSTRACT:
Replacement of the teeth has been documented from a long time. In the present review the evolution of the complete denture bases has been explained from the Egyptian times to till date. The data is collected from the research papers from the online sources. The data was collected with no specification to time or language. We collected literature reviews that have mentioned from earliest to till date. The evolution of the various materials and the technologies is also discussed. The data is presented in the chronological order.
K**eywords:** Complete denture, materials, history, technology development, production methods.

Received: December 14, 2020 Accepted: January 17, 2021

Corresponding Author: Dr. Pragya Bali, Medical officer (Dental) Civil Hospital Sundernagar, Pungh, Himachal Pradesh, India

This article may be cited as: Bali P, Sharma P, Bathla N, Kaprate T, Bali H, Bali S. Evolution on Complete Dentures: A Review. J Adv Med Dent Scie Res 2021;9(1):131-134.

INTRODUCTION:
The branch of the Dentistry has been developing since the last 3000 BC. The country that has been known for the prosthetic and medical history is Egypt was the therapeutic focus of antiquated world. [1] The first dental prosthesis is registered from Egypt in 2500 BC.[2] Dexterously defined dentures were designed in 700 BC. [3] In the medieval times, dentures were seen as a commodity and luxury. They were hand cut and tied set up with silk strings and must be uprooted before eating. [4]

Sixteenth century- Prosthesis from human bones
The first noted complete denture with the complete set of upper and lower denture was recorded in the sixteenth century in Switzerland.[5] They have been made from the curve molded layouts of bone, roughly cut from a bull's femur, and entwined at their back furthest points to frame a pivot. [6] This prosthesis can simply have been helpful instead of working since it molded a façade over standing, yet most likely spoiled, basic teeth. [7] There are no bases taking everything into account and support would have been totally mechanical, gave by residual teeth.

Eighteenth century- Metals and other natural products
From the old Egyptian tombs the denture cuts from the wood were procured. They were also seen to be of Ivory [8], but there has been no thorough documentation of this elsewhere.

Again, the analysts referred to the Roman craftsman Martial to support the point of view that complete dentures were given in old Rome, and Ambler communicated that a complete plan of dentures, fabricated in gold, [9] was found in a Roman burial place two or three years before the period of his writing in mid eighteenth century. [10] Notwithstanding, this report is keen on vulnerability as no subtle components were given, reference to Roman complete dentures, in gold or something different, been found in the composition. [11] The assembling of a denture was at first depicted by Purmann (1648-1721) in his Wundarzenei of 1684. [12] A piece of wax was to some degree cut and incompletely framed to the pined for shape and structure, with the objective that it imitated the missing teeth, fitted comfortably against those excess, and was acclimated to the feeling of taste and extra alveolar edge. [13] This model was then used by a specialist for age in bone or ivory.[1, 6, 14]

Be that as it might, a particularly complete denture is unattainable to have depended on upon its base for support, since a large evolved wax model would have been required which would be hard to remove from the mouth without bending. [15, 16] The model, thusly, was kept little with insignificant base development. Retentiveness was whimsical except if maintained by mechanical methods, for instance, springs-which were apparently introduced by Fauchard (1678-1761). [6, 17] Infrequently, support without springs was done: Fauchard depicted three dentures he had given 'which required virtuoso and incredible skill to make and that are held without springs', [18] yet his remarks derive that springs were seen by him as the only, wellspring of complete denture maintenance. [19]

There is little doubt that the spring presumably been awkward to the wearer, and appear to be responsible for sensitive tissue cut. It is strange whether such dentures helped or disturbed the eating. [20] What was required, it was not at this point reviving, was an costly denture base to hold occlusal weight and one which, by its enlargement, would similarly help security and maintenance.[17] Frederick the Great's dental trained professional, added to a more suitable impression technique. His method was to take, in two pieces, wax impressions of entire jaw. [6, 21] The pieces were freely assessed, as such limiting bending, and re-amassed outside the mouth and a mortar cast was created utilizing them. This technique appears to have been incomprehensible even to Fauchard, whose procedures Pfaff for the most part almost took after.

With a reasonably exact and dimensionally stable cast available, the carver could then change the denture to it without continuous reaction to the patient. [6] A piece of ivory was shaped with a drill and engraving cutting edge, using a shade to recognize high spots as the base was made to fit the cast. Tomes depicted a system using his own personal authorized machine advancement which, he ensured, disturbed the use of shade. [22] Included legitimacy was to a great extent searched for by the development of human front teeth to an ivory base and a couple of outlines of such dentures appear in the composition, for example, Guerini, Ash and Woodforde. Mishaps in both the Battle of Waterloo and the American Civil War gave an impressive amount of the teeth used, in this manner the term 'Waterloo Teeth'. [23-25]

Ivory was not an ideal base material since it regularly rotted in the mouth, as moreover did eliminated human teeth. A letter of 1798 to George Washington from his dental expert contained bare essential direction on countering the stains and for interfacing openings to the President's dentures. These defects were expected by the dental expert to have been welcomed on by introduction to port wine and 'different acids'. [26] Bermore declared a change as "the pressing factor is continually delicate whether the mouth is open or close' supporting the maintenance of the ivory base, [1] itself portrayed by him as something different 'fitting precariously on the gums'. This sort of spring was likely a twisting, for instance, those seemed to have been combined in Washington's prosthesis. [6, 27] The President is, regardless, offered an explanation to have found his teeth aggravating to wear and hard to eat with. His dentures were essentially insufficient and furthermore being recolored, set, and foul from decay.

Late eighteenth century- Porcelain

Around 1774, Alexis Duchâteau made the porcelain dentures. [1, 28] Be that as it might, these were slanted to chip moreover tended to appear excessively white to conceivably be convincing. Porcelain shaped teeth were put onto gold plates. These were the primary dentures that give off an impression of resembling front line dentures. They were incredibly white in concealing, anyway could be made in different shades. [29] In an interval, Dubois de Chamant finished the porcelain system with the guide of the Sevres porcelain fabricating plant, and got the recognition of the Academy of Sciences, Faculty of Medicine. He moved to London and was surrendered a British patent in 1971, and set up training. He attested that 12000 of his sets were being utilized in 1804, which would exhibit wide understanding affirmation of his methodologies. He portrayed his system for making dentures in a single piece from a paste which was shaped to models of the mouth. It was then bit by bit dried and the chart sorts of the teeth were cut, and the whole pieces was warmed. [30] Finally the white piece was plated to a concealing identifying with the gums and teeth.

Early ninteenth century- Accurate hand carving ivory, vulcanite, xyloidine

A few dental experts could go over Dubois de Chemant results, given the shrinkage of porcelain in the midst of ending. This was not a shortcoming anyway when particular teeth were created utilizing porcelain. [31] This was before long seen and completely abused. More unmistakable precision could be cultivated by hand cutting ivory. Vulcanite had various focal points over each and every other material then available. [1, 32] It was terrible and could be easily changed in accordance with a cast of the mouth, the estimations and surface focal point of which it could accurately reproduce when cured. [33] Endeavors were made to cut humble dentures from wood, which easily worked anyway unaesthetic and subject to quick fouling in the mouth. Tortoisehell was used with some achievement around 1850, [34] being shaped as later would be celluloid. Its shade was better than anything vulcanite, anyway the need to use camphor as a plasticizer gave it a horrendous taste and fragrance. It is meant the introduction of the plastics whose set of experiences dates from 1832, since Braccanot's headway of Xyloidine from starch cotton and wood fibers. [6, 34]

Late ninteenth century and early 20th century - Tin and aluminium introduction to Bakelite

Each choice material had genuine insufficiencies, either in physical properties due to the relentless strategies of manufacture required. Tossed tin was by and large used until the presence of aluminum, which gradually supplanted it being substantially more grounded, even more perfectly, and strong. Tries were made to swage aluminum bases instead of gold, anyway again, similarly as with gold, association of teeth and gum work to it was difficult to achieve. [15] Bakelite, a phenol-formaldehyde pitch, had been found in 1909. [35] By 1924, such tar were being made mechanically and, in at that point and 1939, as much as fifteen aftereffects of this sort were familiar with dentistry. [1, 6, 13, 17]

Late 20th - Ideal material: PMMA.

Rohm and Hass (1936) introduced PMMA in sheet design and Nemours (1937) in powder structure. [36] [13] Dr. Walter Wright (1937) introduced Polymethyl methacrylate as a denture base material which transformed into the polymer to be used as a piece of the accompanying ten years. [37] This material has been secluded into two sorts into two sorts in light of the strategy for initiation. In1947, substance activators were used to prompt denture base polymerization at room temperature.[31] These were furthermore implied as cold cure, self cure or auto polymerizing tars. [38]

Compound authorization is capable through the extension of a tertiary amine, for instance, dimethyl-para-toluidine [38, 39], to the monomer, which in the wake of mixing causes decay of benzoyl peroxide.[40] This releases free radicals to begin polymerization. [39]

Advantage: Greater dimensional exactness as a result of lessened polymerization shrinkage. [41]

Disadvantages: Incomplete polymerization prompts more unmistakable proportion of unreacted monomer in the denture base making decreased cross over quality and is a potential tissue irritation. [42] Water amassing diminishes the degree of residual monomer. The shading dependability is generally average. Regardless, the complete denture base material that has most central focuses and which is generally, exclusively, used today, and in actuality which addresses a fair method to manage the ideal material, is PMMA.

Conclusion

The evolution from naturally materials to the use of synthetic resins in denture construction designates the extent of growth taking place. Research approved out by workers has promoted the foundation of future knowledge and it can be expected that the unending search for denture base materials with necessary qualities will always continue. The capability to manufacture complete dentures by means of computer-aided technology has untold educational, investigational, and clinical possibilities for the future.

References

1. Tandon, R., S. Gupta, and S.K. Agarwal, Denture base materials: From past to future. Indian Journal of Dental Sciences, 2010. 2(2): p. 33-39.
2. Abraham, C.M., Suppl 1: A Brief Historical Perspective on Dental Implants, Their Surface Coatings and Treatments. The open dentistry journal, 2014. 8: p. 50.
3. Handa, M., Flexible dentures: a boon in compromised conditions. Indian Journal of Dental Advancements, 2015. 7(2): p. 132-136.
4. Weinberger, B.W., The history of orthodontia. International Journal of Orthodontia, 1918. 4(7): p. 359-387.
5. Sears, V.H., Developments in the denture field during the past half century. The Journal of Prosthetic Dentistry, 1958. 8(1): p. 61-67.
6. Murray, M.D. and B.W. Darvell, The evolution of the complete denture base. Theories of complete denture retention—a review. Part 1. Australian dental journal, 1993. 38(3): p. 216-219.
7. Hopp, C.D. and M.F. Land, Considerations for ceramic inlays in posterior teeth: a review. Clinical, cosmetic and investigational dentistry, 2013. 5: p. 21.
8. Johnson, W.W., The history of prosthetic dentistry. The Journal of Prosthetic Dentistry, 1959. 9(5): p. 841-846.
9. Opposing, C.D., Maxillary changes under complete dentures opposing mandibular implant-supported fixed prostheses. 1999.
10. Crubzy, E., et al., False teeth of the Roman world. Nature, 1998. 391(6662): p. 29-29.

11. Forchhammer, M., E. Post, and N. Stenseth, False teeth of the Roman world. Nature, 1998. 391(6662): p. 29-29.
12. Kalra, S., D. Dalal, and D. Beniwal, History of complete denture base materials. Indian Journal of Oral Health, 2012. 2(1): p. 1-6.
13. Khindria, S., S. Mittal, and U. Sukhija, Evolution of denture base materials. The Journal Of Indian Prosthodontic Society, 2009. 9(2): p. 64.
14. Meng, T.R. and M.A. Latta, Physical properties of four acrylic denture base resins. J Contemp Dent Pract, 2005. 6(4): p. 93-100.
15. Grunewald, A., Gold base lower dentures. The Journal of Prosthetic Dentistry, 1964. 14(3): p. 432-441.
16. Sato, Y., Clinical methods for adjusting retention force of cast clasps. The Journal of prosthetic dentistry, 1999. 82(5): p. 557-561.
17. Murray, M.D., Physical aspects of complete denture retention. HKU Theses Online (HKUTO), 1989. Research J. Pharm. and Tech. 9(8): August. 2016 1072
18. Deltombe, X., Pierre Fauchard, his life and his work. Journal of Dentofacial Anomalies and Orthodontics, 2011. 14(1): p. 103.
19. Lynch, C.D., V. O'Sullivan, and C. McGillycuddy, Pierre Fauchard: the'father of modern dentistry'. British dental journal, 2006. 201(12): p. 779-781.
20. Bolla, S.C., N.S. Gantha, and R.B. Sheik, Review of History in the Development of Esthetics in Dentistry.
21. Meyer, F.S., The generated path technique in reconstruction dentistry: Part I: Complete dentures. The Journal of Prosthetic Dentistry, 1959. 9(3): p. 354-366.
22. Price, C., A history of dental polymers. Australian prosthodontic journal/Australian Prosthodontic Society, 1993. 8: p. 47-54.
23. Shaw, P.J., 'Shocking Sights of Woe': Charles Bells and the Battle of Waterloo. 2005.
24. Carney, A., Failed back surgery syndrome: Foreword. Neurochirurgie, 2015. 61: p. S1-S4.
25. Feinberg, E., A short history of modern dentistry. 2015.
26. Woelfel, J.B., G.C. Paffenbarger, and W.T. Sweeney, Clinical evaluation of complete dentures made of 11 different types of denture base materials. The Journal of the American Dental Association, 1965. 70(5): p. 1170-1188.
27. Anderson, T., S. O'Connor, and A. Ogden, An early eighteenth- century denture from Rochester, Kent, England. Antiquity, 2004. 78(302): p. 858-864.
28. Kelly, J. and P. Benetti, Ceramic materials in dentistry: historical evolution and current practice. Australian dental journal, 2011. 56(s1): p. 84-96.
29. Vallittu, P.K. and M. Kokkonen, Deflection fatigue of cobalt- chromium, titanium, and gold alloy cast denture clasp. The Journal of Prosthetic Dentistry, 1995. 74(4): p. 412-419.
30. Kortrakulkij, K., Effect of denture cleanser on color stability and flexural strength of denture base materials. 2008, Mahidol University.
31. Jagger, D. and A. Harrison, Complete dentures: problem solving. 1999: British Dental Association.
32. Waliszewski, M., Restoring dentate appearance: a literature review for modern complete denture esthetics. The Journal of prosthetic dentistry, 2005. 93(4): p. 386-394.
33. Könönen, M., et al., Titanium framework removable partial denture used for patient allergic to other metals: a clinical report and literature review. The Journal of prosthetic dentistry, 1995. 73(1): p. 4-7.
34. Ladha K, Verma M. 19th century denture base materials revisited. Journal of History of Dentistry. 2011 Spring; 59(1): 1-11
35. Alla, R.K., et al., Influence of fiber reinforcement on the properties of denture base resins. 2013.
36. Graham, R.K., D.L. Dunkelberger, and J.R. Panchak, Synthetic approaches to atactic poly (methyl methacrylate). Journal of Polymer Science, 1962. 59(168).
37. Anne, G., et al., The effect of aluminum oxide addition on the flexural strength of heat activated acrylic resin: An in vitro study. Journal of Dr. NTR University of Health Sciences, 2015. 4(1): p. 21.
38. Barker, L.M. and R. Hollenbach, Shock-wave studies of PMMA, fused silica, and sapphire. Journal of Applied Physics, 1970. 41(10): p. 4208-4226.
39. Jagger, R.G., et al., Some variables influencing the bond strength between PMMA and a silicone denture lining material. International Journal of Prosthodontics, 2002. 15(1).
40. Göcke, R., F. Gerath, and H. Von Schwanewede, Quantitative determination of salivary components in the pellicle on PMMA denture base material. Clinical oral investigations, 2002. 6(4): p. 227-235.
41. Lee, S.-I., et al., Strength of glass fiber reinforced PMMA resin and surface roughness change after abrasion test. 2007.
42. Lee, S.I., C.W. Kim, and Y.S. Kim, Effect of chopped glass fiber on the strength of heat-cured PMMA resin. J Korean Acad Prosthodont, 2001. 39(6): p. 589-98.