ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25aug172

Advances in Self Ligating Brackets: An Overview

Dr. Kajal Magar[1]; Dr. Chetan Patil[2]; Dr. Anshuj Thetay[3]; Dr. Pradeep Kawale[4]; Dr. Pradeep Kumar[5]; Dr. Snehal Bhalerao[6]; Dr. Aameer Parkar[7]; Dr. Manorama Wakle[8]

[1;2;3;4;5;6;7;8]Yogita Dental College and Hospital, Khed

Publication Date: 2025/08/14

Abstract: Self-ligating brackets (SLBs) have emerged as a widely used alternative to conventional orthodontic brackets, featuring a built-in mechanism that eliminates the need for elastomeric or wire ligatures to hold the archwire in place. This review summarizes the current evidence on the clinical performance, advantages, and limitations of SLBs. Key purported benefits include reduced frictional resistance, shorter treatment times, improved patient comfort, and enhanced oral hygiene. However, clinical findings remain mixed, with several studies reporting no significant differences in treatment outcomes, discomfort, or duration compared to conventional systems. Additionally, SLBs are associated with higher costs and may present challenges related to bracket bulk and mechanical complexity. Despite their growing popularity, SLB selection should be tailored to individual patient needs, treatment goals, and orthodontist experience. Further long-term randomized controlled trials are needed to establish definitive clinical guidelines.

How to Cite: Dr. Kajal Magar; Dr. Chetan Patil; Dr. Anshuj Thetay; Dr. Pradeep Kawale; Dr. Pradeep Kumar; Dr. Snehal Bhalerao; Dr. Aameer Parkar; Dr. Manorama Wakle (2025) Advances in Self Ligating Brackets: An Overview. *International Journal of Innovative Science and Research Technology*, 10(8), 346-350. https://doi.org/10.38124/ijisrt/25aug172

I. INTRODUCTION

Orthodontic treatment has significantly advanced in recent decades, driven by innovations aimed at improving efficiency, comfort, and clinical outcomes. Among these developments, self-ligating brackets (SLBs) have gained considerable attention as an alternative to conventional bracket systems. Unlike traditional brackets that use elastomeric or metal ligatures to hold the archwire in place, SLBs incorporate a built-in clip or sliding mechanism. This design aims to minimize friction between the archwire and bracket, thereby enhancing the efficiency of tooth movement.

SLBs are believed to allow more effective tooth movement, fewer appointments, and better oral hygiene due to the absence of elastomeric ligatures, which can harbor plaque. Despite these proposed benefits, research outcomes have been inconsistent. This review critically evaluates current literature to provide a balanced overview of SLBs' advantages, disadvantages, and clinical performance.

➢ *Advantages*

Feature	Benefit
✓ Reduced Friction	Minimizes resistance between archwire and bracket for potentially more efficient tooth movement
✓ Fewer Appointments	Longer intervals between visits due to less wear on ligation mechanisms.
✓ Oral Hygiene is improved	Absence of elastomeric ligatures prevents food and plaque accumulation
✓ Greater Comfort	Lower friction may translate to lighter forces and less discomfort.
✓ Faster Chair Time	Quicker archwire engagement/disengagement.
✓ Potential for Shorter Treatment Time	Some studies report reduced overall treatment duration.

➢ *Disadvantages*

Feature	Drawback
✓ Higher Cost	SLBs are typically more expensive than traditional systems.
✓ Complex Design	Mechanical components increase the potential for breakage or malfunction.
✓ Limited Effect on Treatment Time	Clinical studies often show no significant time savings.
✓ Not Ideal for Severe Cases	May not provide optimal control in complex malocclusions.
✓ Aesthetic Concerns	Some metal SLBs are more visible and less aesthetic than ceramic or lingual options.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25aug172

II. CLASSIFICATION OF SELF-LIGATING BRACKETS

- *Based on Mechanism of Ligation*

Table 1 Based on Mechanism of Ligation

Type	Description	Examples
Passive	Clip or slide does not press against archwire, minimizing friction.	Damon, SmartClip, Clarity SL
Active	Spring clip presses against the wire, allowing greater control.	SPEED, In-Ovation R, Time 2/3
Hybrid/ INTERACTIVE	Self-ligating brackets exhibit passive mechanics when used with lighter wires and transition to active engagement with heavier wires.".	Empower, In-Ovation C, Vision LP

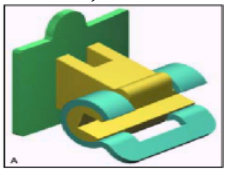
- *Based on Material*

Table 2 Based on Material

Material	Notes	Examples
Metal	Durable and commonly used	SPEED, Damon Q
Ceramic	Aesthetic, may be more fragile	Damon Clear, Clarity SL
Composite	Translucent, aesthetic, lower strength	Oyster SLB
Hybrid (Metal + Ceramic)	Combines strength and aesthetics	In-Ovation C

- *Based on Structural Design & Features*

Table 3 Based on Structural Design & Features

Type	Key Features	Examples
Original Models	Early innovations in SLB (mechanical systems, screws, caps, etc.)	Russell Lock, Edgelok 
Spring Clip-Based	Use of spring mechanisms for active ligation	SPEED, In-Ovation 
Sliding Door/Cap	Sliding cover over the bracket slot	Damon, Clarity, Quick 
Rotational Slide	Hinged or rotational slide mechanisms	Activa, Time 2/3 
No Moving Parts	Smart metal clips without slides or doors	SmartClip, Vision LP 

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25aug172

➢ *Based on Application Site*

Table 4 Based on Application Site

Site	Notes	Example Brackets
Labial	Standard placement on the facial side	Most brackets (e.g. Damon, SPEED, In-Ovation)
Lingual	Placed behind teeth, more aesthetic	In-Ovation L, Adenta Evolution, Philippe 2D/3D

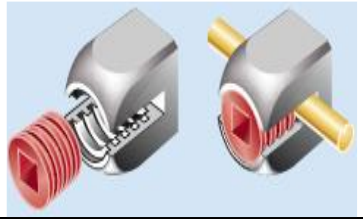
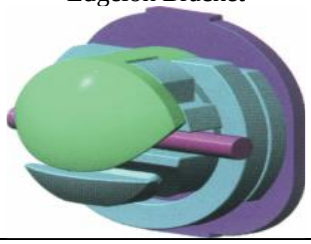
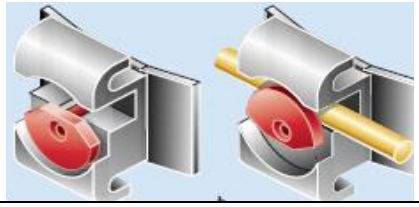
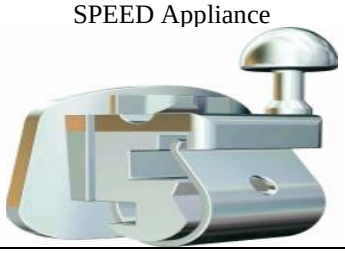
➢ *Notable Commercial SLB Systems*

Table 5 Notable Commercial SLB Systems

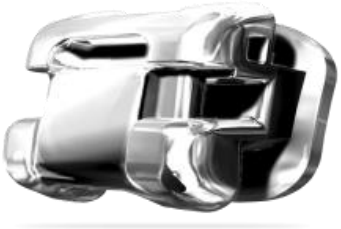
Brand/System	Type	Unique Features
Damon System	Passive	Slide mechanism, low friction, esthetic versions available
SPEED System	Active	Spring clip, compact design, auxiliary slot
In-Ovation R/C/L	Active/Hybrid	R = metal, C = ceramic, L = lingual
SmartClip	Passive	No door, NiTi clips, MBT prescription
Clarity SL	Passive	Ceramic body with metal slot, aesthetic
Quick 2	Active	Efficient clip mechanism, torque control
Activa	Active	Broad bracket, spinning slide
Oyster	Passive	Composite aesthetic bracket
Opal/Opal M	Passive	Aesthetic, fiber-reinforced, gentle on soft tissues
Discovery SL	Passive	Metal, low profile, aesthetically shaped
Time 2/3	Active	Metal injection molded, user-friendly, but bulky
Vision LP	Hybrid	Low profile, easier debonding, clear bracket markings

➢ *Evolution Timeline*

Table 6 Evolution Timeline

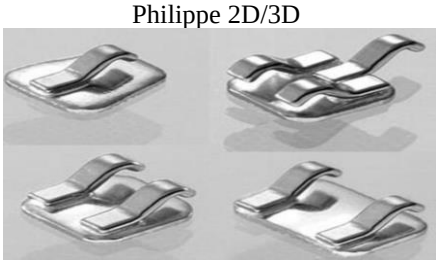
Year	Innovation	Developer
1935	Russell Lock Bracket 	Dr. Jacob Stolzenberg
1972	Edgelok Bracket 	Dr. Jim Wildman
1974	Mobil-Lock Bracket 	Dr. Franz Sander
1980s	SPEED Appliance 	Dr. G. Herbert Hanson

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25aug172

1990s	Damon SL 	Dr. Dwight Damon
2000s	In-Ovation, SmartClip, Clarity SL 	GAC, 3M, etc.
2010s–2020s	Damon Q, Q2, Quick, 	Ormco, Forestadent, AO

➢ *Lingual SLBs*

Table 7 Lingual SLBs

Type	Notes
Philippe 2D/3D 	2D: simple control; 3D: full control with vertical slot
In-Ovation L 	Compact lingual SLB with curved base for palatal fit
Adenta Evolution 	Occlusal insertion, functions as bite plate

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25aug172

Phantom (Gestenco) 	Polyceramic, no ligatures, bonded with flowable composite

III. CONCLUSION

Representing a modern evolution in orthodontic care, self-ligating brackets offer distinct mechanical advantages. Offering reduced friction, improved hygiene, and simplified wire changes, they provide several potential advantages over conventional brackets. However, their efficacy remains case-dependent, and their higher cost and complexity should be considered. A tailored approach based on patient needs and clinician experience is crucial for achieving optimal outcomes. Further research, especially long-term randomized controlled trials, is essential to validate clinical advantages and guide treatment protocols.

REFERENCES

[1]. Baxi S, Tripathi AA, Bhatia V, Dubey MP, Kumar P, Bagde H. Self-ligating bracket systems: a comprehensive review. Cureus. 2023 Sep;15(9

[2]. Pizzoni L, Ravnholt G, Melsen B. Frictional forces related to self-ligating brackets. Eur J Orthod. 1998 Jun;20(3):283–91.

[3]. Paduano S, Cioffi I, Iodice G, Rapuano A, Silva R. Time efficiency of self-ligating vs conventional brackets in orthodontics: effect of appliances and ligating systems. *Prog Orthod.* 2008 Jan;9(2):74–80.

[4]. Fleming PS, Johal A. Self-ligating brackets in orthodontics: a systematic review. J Int Oral Health. 2015 Sep;7(9):108.

[5]. Mathur P, Tandon R, Chandra P, Dhingra R, Singh P. Self ligating brackets: From past to present. *Int J Orthod Dentofac Res.* 2021 Oct 28;7:216–22.

[6]. Harradine N. The history and development of self-ligating brackets. Semin Orthod. 2008 Mar;14(1):5–18.

[7]. Zhou Q, ul Haq AA, Tian L, et al. Canine retraction and anchorage loss self-ligating versus conventional brackets: a systematic review and meta-analysis. *BMC Oral Health*. 2015 Nov 4;15:136

[8]. Zhang DP, Liu J, Liu Y, Sun N, Yi JC. Influence of self-ligating and conventional brackets on dental arch width in non-extraction treatment: a meta-analysis. *Shanghai J Stomatol.* 2014;23(3):367–72.

[9]. Capistrano A, Cordeiro A, Siqueira DF, et al. From conventional to self-ligating bracket systems: is it possible to aggregate the experience with the former to the use of the latter? *Dental Press J Orthod*. 2014;19(3):139–57

[10]. Thapa B, Wu LP. Self-ligating brackets in perspective of friction: A review. *Orthod J Nepal*. 2013 Dec;3(2):40–3.