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# Implant–Abutment Connections: A Narrative Review of Designs, Biomechanics and Peri-Implant Considerations

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## ABSTRACT

**Background:** The implant–abutment interface is an important determinant of prosthetic stability, load transfer and the biological response around dental implants.

**Objective:** To describe the types of implant–abutment connections and compare their mechanical and biological considerations.

**Methods:** A narrative synthesis was prepared exclusively from the supplied 54-slide presentation. No independent systematic literature search was undertaken.

**Results:** The presentation distinguishes external and internal connections, slip-fit and friction-fit joints, spline attachments, Morse-taper designs and platform switching. Internal and conical designs are described as offering mechanical and microbial-seal advantages over conventional external designs, although no connection is completely free of microgaps or bacterial leakage.

**Conclusion:** Connection selection requires attention to mechanical stability, prosthetic configuration and peri-implant tissues. The comparative assertions in the presentation require cautious interpretation because primary-study methods are not supplied.

**Keywords: Dental implants; implant–abutment interface; external hexagon; internal connection; Morse taper; platform switching.**

## INTRODUCTION

Implant-supported restorations have become established in contemporary restorative dentistry. Restoration-driven planning requires understanding the design of the implant–abutment junction and its contribution to prosthesis stability [1,3,4].

The implant–abutment interface links the implant fixture with the prosthesis. The geometry of the junction, implant diameter, abutment screw and resistance to rotation influence mechanical performance [1,4].

## IMPLANT COMPONENTS AND ABUTMENT TERMINOLOGY

The dental implant assembly includes the implant body, abutment, abutment screw and definitive prosthesis. An abutment is the component used to support or retain a fixed or removable implant prosthesis [2].

Abutments may be straight or angulated relative to the implant long axis. Angulated abutments may be selected when implant orientation differs from the proposed prosthetic axis [3,4,6,7].

## CLASSIFICATION OF IMPLANT ABUTMENTS

The presentation classifies abutments by connection to the restoration, fabrication material, fabrication method, colour and implant-connection type [1,3,4].

Restorative configurations include a screw-retained abutment–crown complex, a two-piece design with a screw-retained crown and a two-piece design with a cement-retained crown [1,3,4].

Three anatomical or functional segments may be distinguished: the prosthesis-connection segment, implant-connection segment and transgingival segment [1].



**Figure 2. Straight and angulated abutment examples (Source: supplied presentation, slide 6).**

## GEOMETRY AND MECHANICS OF THE CONNECTION

The implant crest module receives the prosthetic component and may include a seating platform and antirotational feature. Examples described in the presentation include external hexagon, internal hexagon, octagon, conical designs, grooves and pin-slot configurations [1].

A slip-fit joint provides a passive relationship with slight space between joining components, whereas a friction-fit joint engages the contacting surfaces more closely. Butt and bevel joints describe additional contact geometries [1].

## EXTERNAL PROSTHETIC CONNECTIONS

External hexagon connections are discussed in the presentation in relation to the early Brånemark implant system. Their geometry locates the antirotational feature above the implant platform [1].

The presentation associates external connections with lateral micromovement, cervical stress concentration, screw loosening, bacterial leakage and crestal bone changes. These are comparative claims from the source slides, rather than results independently verified in this review [1].

## INTERNAL PROSTHETIC CONNECTIONS

Internal connection designs locate the engagement geometry within the implant body. The source presentation describes favourable resistance to deformation, mechanical stability and load transfer compared with external configurations [1].

It also describes comparatively lower marginal bone loss for internal connections while stating that implant–abutment connection type did not necessarily alter implant survival. Occlusal loading can still open and close the interface and contribute to fluid movement and microbial contamination [1].

**MORSE-TAPER CONNECTIONS**

The Morse-taper design is presented as an internal conical interface with close-fitting mating surfaces. The source describes reduced microgap, lower micromovement and improved stability under cyclic loading in some comparisons [1].

The presentation also identifies potential axial displacement as a consideration in cement-retained prostheses. It does not establish that all Morse-taper designs are screw-free, nor that they provide a complete bacterial seal [1].

**SPLINE CONNECTIONS**

Spline attachments use projecting fins and matching grooves to provide rotational indexing. The presentation describes a six-spline configuration, developed by Calcitek in 1992, with six rotational positions at 60-degree intervals and potential utility with angulated abutments [1].

**PLATFORM SWITCHING**

Platform switching refers to using an abutment narrower than the implant platform. The presentation attributes the terminology to Gardner (2005) and subsequent discussion by Lazzara (2006) [1].

The source proposes that moving the implant–abutment junction inward may help preserve crestal bone and support soft-tissue volume and aesthetics. It reports a numerical bone-loss value, but the underlying study is not identifiable from the supplied reference list; that numerical estimate has therefore not been repeated as a verified finding [1].

## DISCUSSION

Across the connection types, the source presentation emphasizes the trade-off between prosthetic indexing, mechanical resistance and biological sealing. Its comparison generally favours conical and internal connections for microgap and mechanical behaviour, while acknowledging that none can fully prevent microbial leakage [1].

The presentation references broader implant-abutment selection literature, including abutment selection criteria, angled abutment techniques and emergence profile management [3–7,10,11]. However, the slide deck does not map individual comparative outcomes to those publications, so assigning a specific trial result to any one citation would be unwarranted.
Selection should account for prosthetic design, implant position, abutment angulation, available restorative space and the peri-implant soft tissue relationship [3–11].

## LIMITATIONS

This is a narrative review of one educational presentation, not a systematic review. The source does not provide study selection criteria, critical appraisal, pooled data or a claim-by-claim citation map. The citations therefore support general subject areas where identifiable, while specific comparative claims are explicitly attributed to the presentation. No words, scientific data, images or references were drawn from the supplied formatting-example PDF.

## CONCLUSION

The implant–abutment interface affects rotational and lateral stability and the mechanical behaviour of implant-supported restorations. The presentation identifies potential advantages of internal and conical connections and of platform switching, but acknowledges persistent microgaps and possible bacterial leakage. Clinical selection should integrate restorative and biological requirements, and comparative conclusions should be confirmed against primary studies before journal submission [1,3,4].

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12. Editorial note: Reference details are transcribed from the supplied presentation without independent bibliographic verification. The presentation contains no separate study-by-study citation mapping for many comparative claims.