INTRODUCTION

With the advance in material science and bonding technologies, restoration of missing anterior teeth can be dealt with implants and conventional porcelain-fused-to-metal and resin-bonded fixed partial dentures. In cases where edentulous space is excessive, and there are surgical limitations, then a variant of fixed partial denture the cantilever principle can be considered. Cantilever fixed dental prosthesis, also known at various times as the flying pontic, direct extension bridge, a free end, swing-on or throw-off bridge. It is the type of fixed partial denture in which the pontic is cantilevered, i.e., is retained and supported only on one end by one or more abutment.

CASE REPORT

The case we present here is about a 40-year-old female patient reported to the Department of Prosthodontics, with a missing right maxillary lateral incisor (Figure 1). On intraoral examination, the anterior edentulous space with missing lateral incisor had increased mesio-distal width, caries involving right second premolar and compromised crown root ratio of sound adjacent teeth (Figure 2).

A single tooth implant and removable partial denture was a viable alternative. However, the implant would entail surgery and a more protracted treatment. However, the patient was neither willing for removable prosthesis nor surgery for implant placement and wanted an immediate fixed alternative for the right lateral incisor.

Instead of conventional fixed partial denture, to avoid unnecessary involvement of sound adjacent tooth, and posterior tooth needs crowning as well, a bar type of spring cantilever bridge was planned to cover the edentulous space. Thus, second premolar was decided as the abutment support due to caries involvement.

PROCEDURE

Restoration and tooth preparation done in relation to the right second premolar, with slight sub gingival finish line. Retraction procedures were carried out, a polyvinyl siloxane impression was made using the putty reline technique in a rim-lock impression tray and cast was poured. Keeping in mind, that the palatal bar connector should be long, thin, and resilient, it should extend from the posterior region, closely adapting to the palatal surface so that it is partly supported by soft tissue. The wax pattern for the connector was fabricated using 0.8 mm × 4 mm casting strip wax, extending from second premolar towards edentulous space (Figure 3).

The rest of the laboratory procedures were common with that of conventional metal-ceramic fixed partial denture construction. Metal try-in was performed to verify the extension, adaptation, fit of the casting (Figure 4). Ceramic
build up was completed, and the bridge was cemented (Figure 5).

**DISCUSSION**

A cantilever beam by definition (Tylman, 1970), is a beam that is supported by only one fixed support at one of its ends. The cantilever principle has been applied in two-ways, in the development of the spring cantilever bridge, in which the pontic is supported by a bar attached to a remotely situated retainer, and in the direct cantilever bridge, in which the pontic is attached to an adjacent retainer.8,9

One of the designs in spring cantilever bridge is the pontic that is connected to its retainer by a relatively long flexible palatal connector bar. Thus resembling a bridge that is fixed only on one end, hence the name “spring cantilever bridge.” As it is essentially a tissue-supported but tooth-retained abutment, the forces of mastication acting on the pontic are absorbed by the supporting palatal mucoperiosteum and completely dissipated before they reach the abutment tooth.8 The spacing between the teeth can be maintained or even altered based on the patient’s preference. However in adhesive dentistry, this same design can be used except that the fitting surfaces of the cast retainers have to be etched, and resin cemented.9,10 According to recent literature two fixed-fixed and two cantilever resin-retained palatal bar connector bridges have been reported, but the palatal bar connectors were short and the pontics were rigidly connected to their retainers.11

The popularity of spring cantilever fixed partial denture began from Essig in 1897 and various modifications (Thompson in 1947, Kantorowicz in 1957, Heigeiway and Williams in 1962, Lemmer in 1963, Roussel in 1906 and Johnstone in 1971) have been carried out ever since.12-14
Myers (1969), discuss the dangers of abutment rotation, points out that it is necessary to consider such facts as crown-root ratio, the amount of periodontal support and the relation of the maxillary and mandibular incisors during incision. Nally (1962) also draws attention to the way in which anterior bridges are subject to palato-vestibular thrust which tends to result in rotation about their main axes, but makes it clear that the physiology of the jaw closing movement and the type of occlusion must be taken into consideration. Some situations are clearly less favorable than others.

Schweitzer and Ewing have written in a limited manner on the cantilever principle and have shed some light on such fixed restorations. Ewing found, in many instances wherein the cantilever principle was employed in keeping within the patient’s biologic limitations that such restorations gave prolonged periods of service and did not cause tissue destruction (Table 1).

As a general principle, conventional fixed bridgework, supported by abutments at both ends, is to be preferred if tooth structure, alignment and periodontal support permit an aesthetic and functional result. However, there are certain situations in which the fixed bridge will not meet these requirements and where a partial denture as an alternative could not be tolerated, or would be precluded because of potential damage to periodontal tissues, or simply on the grounds that a denture would prove socially unacceptable (Tables 2 and 3).

Maintenance of health and comfort, serviceability of fixed partial denture and reported that spring cantilever bridge have longer lifespan 3-4 times that of other fixed partial denture. Walton in 1986 reported an even lower mean life span in conventional fixed partial denture. Caries of the abutment tooth accounted for most of the failures, other being porcelain fracture, un-cemented restorations, poor aesthetics, defective margins, fractured root/tooth, periodontal diseases/mobility, periapical involvement and fractured connectors. Lui in 2008 reported that when a spring bridge is judiciously designed it is able to satisfy the demands of the patient to preserve their personal feature of spacing between the teeth.

Though spring cantilever bridge having a permanent long flexible palatal bar is cumbersome to the patient as well as the prosthodontist, but when cautiously fabricated and aptly maintained by the patient, it can provide many years of continued service in function and aesthetics.

**SUMMARY**

Drifting of teeth into the edentulous area may reduce the available pontic space; whereas a diastema existing before extraction may result in excessive mesio-distal width to the pontic space. In such situations, the simplest approach would be to maintain the existing diastema by spring cantilever fixed partial denture. The design and application of spring cantilever bridgework are evaluated in relation to developments in new materials and the significance of the health of the periodontal tissues. Cantilever bridgework is not advanced as a preferred alternative to conventional fixed bridgework but as a means of meeting certain clinical situations which preclude the use of abutment supports at both ends of the bridge. Lack of success in cantilever bridgework can frequently be attributed to the abuse of design rather than failure of the underlying cantilever principle.

**CONCLUSION**

This article describes a method for replacing wide anterior edentulous space with modified fixed dental prosthesis using spring cantilever. Case selection and meticulous planning can result in spring cantilever fixed partial denture being the most esthetic and economical answer in cases with increased mesio-distal width of anterior edentulous space where diastema has to be maintained. Good oral hygiene,
patient motivation and regular follow-up contribute to an impressive life span.

INFORMED CONSENT

A written consent was obtained from the three patients before starting the treatment. They were also informed regarding the various treatment options and the publishing protocols.

REFERENCES


Table 2: Indications
The teeth on either side of the proposed pontic that might ordinarily be used as abutments for fixed bridgework are unsuitable by reason of morphology, periodontal pathology or unfavourable angulation. Cosmetic needs cannot be met by conventional fixed bridgework. The need to avoid unnecessary involvement of sound teeth is an overriding factor on grounds of pulpal risk, cosmetic implications or the temperament of the patient.

Table 3: Advantages
Readily achieved aesthetics
Relatively short clinical chairside time
 Provision of diastema on either side of the pontic
Usually only one posterior abutment is required to support the bridge
The flexible palatal bar acting as a shock absorber reduces the chances of pontic ceramic from fracturing.