

SHORT-TERM CLINICAL AND RADIOGRAPHIC RESULTS OF PIVOT IMPLANTS: A RETROSPECTIVE STUDY

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Abstract

Purpose: The present retrospective clinical study was undertaken to evaluate the survival rate and marginal bone conditions around Pivot Morse Line implants. The purpose was also to compare the results with when these implants are used for immediate/early loading where implants were allowed to heal and osseointegrate before loading.

Material and methods: Seventy-Seven consecutive patients who received implant treatment with 119 Pivot Morse line implants at two different centres were evaluated. The implants were placed in both maxilla and mandible for treatment after loss of single and multiple teeth. Immediate/early loading (within 2 weeks) with temporization was done to 85 implants, while 34 implants were allowed to heal for 8 to 24 weeks before loading. Marginal bone loss was calculated using radiographs taken at placement and after an average of 40 weeks (range 1–18 months) of loading.

Results: 13 (10.92%) of the 119 implants failed within 30 days of surgery. All the failed implants belonged to the immediate/early loading group which was 10.52% for the group whereas for the delayed loading failure rate was 0%. All the implants that failed were done using flapless protocol. The marginal bone loss was 2.7mm (SD 1.3) for all implants, while 51 implants (42%) showed more than 3mm of loss during the follow up. Bone loss was recorded to increase with time. Implants subjected to immediate/early loading showed more bone loss than two-stage implants. Moreover, 42% of immediately loaded and 12% of two-stage implants had more than 3mm of bone loss.

Conclusion: This short-term retrospective analysis showed a good clinical outcome of Pivot Morse Line implants. Marginal bone loss (6mm) was within limits and was found in around 33 of the evaluated implants. Less resorption and no failures were experienced when implants were left undisturbed and allowed to Osseointegrate for 8- 24 weeks before occlusal loading. Within the limitations of the present study, data indicate that immediate loading and flapless surgeries are risk factors for failure of Pivot Morse Line implants.

Keywords: Delayed loading, immediate loading, marginal bone resorption, one-piece implant.

Introduction

Branemark et al in 1977, Albrektsson et al in 1989 and Glauser et al in 2005 through their studies proven that well osseointegrated dental implant can be a viable and predictable treatment option for patient with single or multiple missing teeth. Medical practice regulatory board in India and in western nations don't require new dental implant models to present long term clinical success evidence before entering the market. But it also assumes that the new implant models meet at least the standards set by the older ones. The past data suggests that there have been few dental implant models which have been withdrawn from the market after being very popular. IMZ Cylindrical implant (Dietrich & Wagner 1992; Quirynen et al. 1992; Albrektsson 1993; Haas et al. 1996), Core Vent implants (Malmquist & Sennerby 1990) etc. are few examples of Implants which were withdrawn from the market after showing unacceptable bone loss.

Lately, Dental Implantology has advanced to the biological limits for osseointegration; implant healing time, implants are now being placed immediately after tooth extraction and immediate loading protocols have been introduced (Becker et al. 1994; Glauser et al. 2001; Sullivan et al. 2005). On one hand these approaches have widened indications for osseointegrated implants; on the other they have increased the risk of failure.

In the present study we have tried to investigate retrospectively, a novel two piece morse tapered conical implant system, the Pivot Morse Line™. It has been marketed as an implant with a magical five degree strong taper connection which provides a strong titanium implant collar which is resistant to fracture.

The aim of this study was to present the outcome of 119 Pivot Morse Line implants, consecutively placed at two different dental institutions

Material and Methods

Study design: Two institutional centres were selected which had substantial experience in dental implantology and they were invited to participate in this retrospective study. Instructions to the participating clinicians included that the implants included in the study should be placed consecutively and no implant selection should be done. A total of 77 patients (40 males and 37 females) who received dental implant therapy at the two centres with Pivot Morse line implants were included in the study

The implants had been used in both jaws (54 maxillary and 65 mandibular implants) for treatment after loss of single (47 constructions) and multiple teeth (30 constructions). Sixty-six implants were placed using a flapless approach while a flap procedure was used for 53 implants. Ninety-nine implants were placed

in healed sites and 20 in extraction sockets. Immediate/early loading (within 2 weeks) with temporization was done in 85 implants, while 34 implants were allowed to heal for 8 to 24 weeks before loading.

Radiographic evaluation: Marginal bone was evaluated using digital radiography after surgery and after 1-18 months with average being 10 months. Periapical radiographs were recorded using radiovisuograph in all the cases. Measurements were made using Carestream Studio Software available with Carestream 6200 sensor at the mesial and distal aspects of implant. Each radiovisuograph was calibrated with the known dimensions of the Implant used. Measurements were made to calculate: 1. True Bone loss i.e. the level of bone initially vs the level of bone during subsequent follow-up visits. 2. Marginal Bone loss i.e. the level of bone in relation to the coronal cylinder of implant.

Success Criteria: Implant success was evaluated using the four-field table defined by Albrektsson & Zarb (1993) with the following categories:

1. **Success:** an implant treatment will be judged success if the implant is not mobile, has no associated neuropathy and pain. As many prosthesis were cement retained hence the success criteria was further divided into two groups i.e. Grade 1- an implant which has no mobility and less than 2 mm of bone loss after 1 year of treatment and 0.2mm per year after that. Grade 2- and implant which has no mobility and less than 3mm of bone loss after 1 year of treatment.
2. **Survival:** and implant still in mandible or maxilla but doesn't meet any of the criteria described for being considered a success.
3. **Unaccounted for:** implant were put in this criteria where the patient didn't turn up for the follow-up evaluations.
4. **Failure:** an implant that got removed due to any reason. Statistics: a correlation test was done and the correlation was considered proven if the $P < 0.05$

Results

13 (10.92%) implants were removed post-surgery in five (6.49%) patients due to evidence of infection. All failed implants belonged to Immediate/early loading category (15.3% failure rate). All the implants that failed belonged to flapless surgery technique which gives a failure rate of 19.70%.

All the failed implants belonged to single tooth restorations (failure rate 27.65%) and zero percent failure for multiple teeth constructions.

Mandibular implant were found to be more prone to failure (9 failed out of 65) compared to maxillary (4 failed out of 54), where the failure rate was 13.85% in Mandible and 7.40% in Maxilla.

| Placed Lost Failure | | | |
|---------------------|-----|-----|---------|
| | (n) | (n) | rate(%) |
| All implants | 119 | 13 | 10.92 |
| Mandible | 65 | 9 | 13.85 |
| Maxilla | 54 | 4 | 7.40 |
| Flap surgery | 66 | 0 | 0 |
| Flapless surgery | 53 | 13 | 24.53 |
| Single tooth | 47 | 13 | 27.66 |
| Multi-unit | 72 | 0 | 0 |

| | | | |
|---------------------|-----|----|-------|
| Immediate loading | 85 | 13 | 15.29 |
| Delayed loading | 34 | 0 | 0 |
| Minor bone grafting | 0 | 0 | 0 |
| No grafting | 119 | 13 | 10.92 |

Table No 1: Number placed and failed implants with regard to jaw, surgical technique, construction and loading protocol

Marginal Bone Loss

Marginal bone loss was measured for 113 cases as rest of them were lost before we could measure and compare the marginal bone loss. The mean follow up period was 40 weeks. We didn't have any patient dropouts. The standard bone loss measured was -2.7mm (SD 1.3). As much as 51 implants (42%) showed more than 3mm of loss during the follow up. Bone loss was recorded to increase with time. Implants subjected to immediate/early loading showed more bone loss than two-stage implants. Moreover, 42% of immediately loaded and 12% of two-stage implants had more than 3mm of bone loss. Study also revealed that the bone resorption increased with time ($P < 0.001$). The study also revealed the average marginal bone loss to be 2mm (SD 1.3) after 24 weeks, 2.7mm (SD 1.3) after 48 weeks and 3mm (SD 1.4) after 72 weeks. Marginal Bone loss was slightly less in Flapless cases compared to flap cases i.e., 2.0mm SD 1.3 vs 2.4mm SD 1.3. Implants in immediate extraction case showed slightly more bone loss (2.7mm SD 1.3) when compared to the conventional healed bone cases (3.7mm SD 1.4). Implants with conventional delayed loading showed significantly less bone resorption (1.3mm SD 1.3) when compared to the implants loaded immediately or withing a week (2.8mm SD 1.5).

| | All implants (n=106) | Immediate loading (n=72) | Delayed loading (n=34) |
|--------------------------------|-------------------------|--------------------------------|------------------------------|
| Mean follow up- [weeks(SD)] | 40(16.4) | 48(18.1) | 24(8) |
| Bone loss[mm(SD)] | -2.93(1.4) | -3.7(1.5) | -1.3(1.3) |

Table No 3: Marginal Bone loss from baseline to follow-up

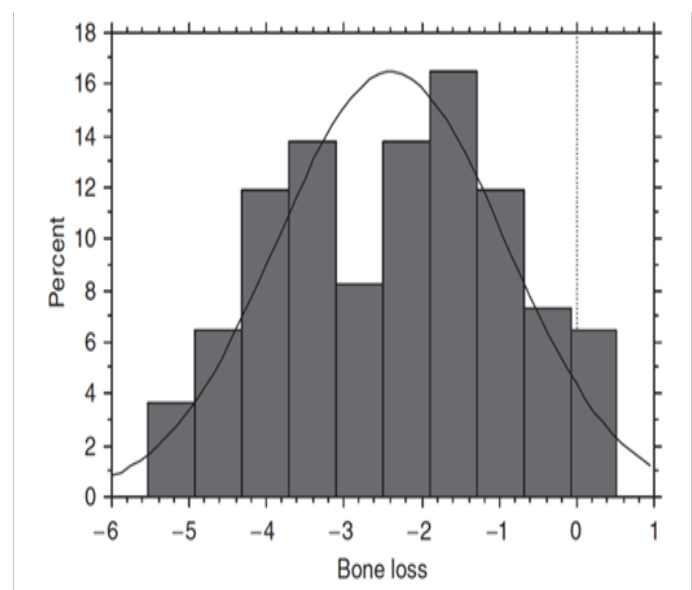


Figure No 1: Frequency- distribution of marginal bone loss

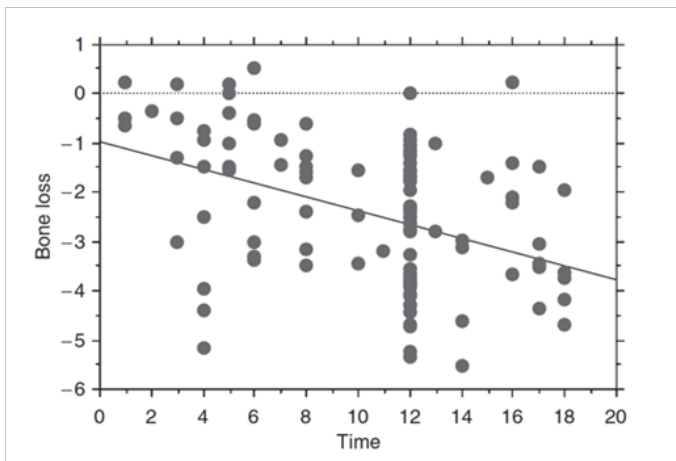


Figure No 2: Correlation plot of time of follow-up against marginal bone loss (Po0.001).

Success Rating

Upon detailed analysis, Success can be considered for 66.9% Implants, Survival for 22.18% and Failure for 10.92%.

Discussion

The result of this study points towards more than normal bone resorption in almost all conditions. Detailed research was conducted on presence of study regarding Pivot Morse Line Implants, but unfortunately till the time of concluding this study no study was available for Pivot Morse Line Implants. The design of Pivot Morse line implants is so unique that we have very sparse data on similar systems. With current limitations of the sparse data, these studies cannot be compared to our study. Pivot Morse line implants don't offer Multi Unit Connection system; hence many multiple implant cases included in our study were given cement retained prosthesis. Cement retained prosthesis leads to extensive peri implant problems due to the retained flush cement. This could be one of the probable reasons for more than normal bone loss. However, there are many other studies available for other implants and implant designs which report good clinical outcomes with immediately loaded cement retained multi-implant cases.

Conclusion

This short-term retrospective study showed almost average bone loss with Pivot Morse Line Implants. The study indicates that the Implant is more suited for conventional flap surgery with delayed loading protocol. Flapless surgery and immediate/early loading are risk factors associated with Pivot Morse line implants. 40 weeks marginal bones loss was slightly on the higher side. With the limitation of the study, further long-term studies with larger sample size are required to reach a conclusion.

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