

**Evaluation of peri-implant bone levels & implant survival between conventional drilling with irrigation versus low speed drilling without irrigation: A clinico-radiographic study.**

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**Conflicts of Interest:** Nil

**Abstract**

**Aim:** To evaluate and compare clinical outcomes involving Crestal bone levels around implants, Probing Depth and Implant mobility and following implant placement with Conventional drilling with Irrigation versus Low speed drilling without Irrigation.

**Materials and Methods:** 40 subjects were selected and were divided into two groups (Group A and Group B). Group A- In this group, implant treatment was performed with Conventional high speed drilling technique that is 800rpm with irrigation and in Group-B implant treatment was performed with low speed drilling technique that is 50rpm without irrigation.

**Observations and results:** Crestal bone levels around implants, Probing Depth and Implant mobility concluded that they were statistically significant difference between Group A and Group B.

**Keywords:** Dental Implants, Low drilling, Irrigation.

**Introduction**

Implant dentistry has evolved over the years. Well defined research in this area has led to the successful and predictable nature of implant dentistry. The conventional two-stage treatment approach was first published by Branemark et al in 1969.<sup>1</sup> The conventional drilling technique at 1500 rpm (Branemark) is currently the gold standard in most of implant systems.<sup>2</sup> Recently, a new

concept of low-speed drilling (50 rpm) without irrigation has been suggested as an alternative to the conventional procedure. The low-speed drilling without irrigation has several advantages over the high-speed drilling with irrigation like difficulty of irrigation can be solved through drill guides during drilling<sup>3</sup>, possibility to collect autograft from the drills by the bone cut without contamination by saliva, can be used for an autograft. Drilling done at low speed provides the operator with more explicit information on the path of the drill so that corrections can be made if necessary. **Watzek et al**<sup>4</sup> had reported many factors for successful healing of implants. Osseointegration is the direct bone support of the implant body without encapsulation by connective tissue at optical microscopic level.<sup>5</sup> Drilling procedures with high speed during dental implant site preparation causes not only mechanical damage to the bone involved but a temperature increase in the bone adjacent to the implant site, hence thermonecrosis has been seen. Increased temperature causes bone resorption. Objective of the study was to compare the results of high speed drilling with irrigation versus low speed drilling without irrigation, in order to evaluate the success rate and peri-implant bone loss.

### Materials and Methods

Total 40 subjects were selected from the Out Patient Department of Periodontics and Oral Implantology. An ethical approval for the study was procured from the ethical committee of the institution. Each subject was given a detailed verbal and written description of the study and all the selected subjects were required to sign an informed consent form prior to commencement of the study.

In this study 40 partially edentulous subjects were selected and randomly divided into two groups on the basis of inclusion and exclusion criteria: **Group A**- In this group,

implant treatment was performed with Conventional high speed drilling technique that is 800rpm with irrigation and in **Group-B** implant treatment was performed with low speed drilling technique that is 50rpm without irrigation.

Selected patients were subjected to routine blood and radiographical (IOPA and OPG) examination. After then, subjects underwent complete oral prophylaxis and restoration of carious teeth. Surgical procedure was performed under local anaesthesia with 2% lidocaine (1:100,000 epinephrine) and a mid-crestal incision (figure 1) was made and full thickness mucoperiosteal flap (figure 2) was reflected to expose the underlying bone. After reflecting the flap, in case of Group A, Implant placement was then performed as per the surgical module. Sutures were placed and implants were immersed (figure 3). And in case of Group B, Implant placement was performed as per the surgical module. The mucosal flap was closed with sutures and implants were submerged (figure 4,5).

Sutures were removed after 1 week in both the groups. Implant loading was carried after 3 months in case of mandible and 4 months in case of maxilla after implant installation.

### Results and Discussion

All the subjects were analysed on the following criteria:

#### 1. Crestal Bone Loss: (Table 1, Graph 1)

The mean height in group A at baseline, 3 month and 6 month and 9 month was found to be 0.00,  $0.17 \pm 0.23$ ,  $0.70 \pm 0.22$  and  $0.87 \pm 0.12$  respectively. A significant difference was observed in height of crestal bone from 3 month-6 month and 3 month-9 month among group A and also from baseline to 9 months ( $p < 0.05$ ). The mean height in group B at baseline, 3 month, 6 month and 9 month was found to be 0.00,  $0.06 \pm 0.13$ ,  $0.17 \pm 0.16$  and  $0.47 \pm 0.17$  respectively. A significant difference was observed in height of crestal bone from 3 month- 6 month

and 3 month -9 month among group B and also from baseline to 9 months ( $p < 0.05$ ).

A significant difference was observed in height of crestal bone among group A and B at 6 month and 9 month. ( $P$ -value $<0.05$ )

**2.Probing Depth: (Table 2, Graph 2)**

The mean probing depth in group A at baseline, 3 month and 6 month was found to be  $1.00 \pm 0.00$ ,  $1.19 \pm 0.27$  and  $1.41 \pm 0.34$  respectively. A significant difference was observed in probing depth from baseline-3rd month and baseline-6th month among group A ( $p < 0.05$ ). The mean probing depth in group B at baseline, 3rd month and 6th month was found to be  $1.00 \pm 0.00$ ,  $1.01 \pm 0.05$  and  $1.12 \pm 0.51$  respectively. A significant difference was observed in probing depth among group A and B at 3 month and 6 month ( $P$ -value $<0.05$ ).

**3.Implant stability: (Table 3, Graph 3)**

The mean implant mobility scores for both the groups i.e. Group A and Group B were  $1.00 \pm 0.00$ . The difference between the groups for the implant mobility when analyzed using Chi-square test and was statistically non significant at  $p= 1.000$ .

Placement of implants has now proven to be a reliable, useful and successful procedure.<sup>6</sup> Rehabilitation of edentulous jaws either partial or complete using endosseous implants has become an important treatment option with good expected results. The predictable esthetic and functional outcomes of the procedure depends on a comprehensive diagnostic evaluation and treatment planning.<sup>7</sup> New concept of low-speed drilling (50 rpm) without irrigation has been suggested as an alternative to the conventional procedure. One of the main concerns of implant placement in drilling without irrigation is the temperature rise caused by drill friction in the bone. Using fixed thermal chambers, Eriksson and Albrektsson<sup>11</sup> investigated the histological effects of heat upon bone.

When a temperature rise occurred, arterial and venous hyperemia was observed during acute effects, and blood flow stopped in different parts of the capillary network. Chover HP et al<sup>8</sup>, Gaspar J et al<sup>9</sup>, Oh JH et al<sup>10</sup> explained the effects of osteotomy at low speed drilling without irrigation. Implants placed with the new technique showed good stability and minimal marginal bone loss that aided in osseointegration. Osteotomies when done at low speed decreased effects like temperature rise, arterial and venous hyperemia which was observed during conventional drilling as acute effects. Blood flow occlusion in different parts of the capillary network as encountered in conventional procedures was not encountered in low speed drilling. No connective tissue reactions were appreciated in the procedure. The authors concluded that in order to enable successful osseointegration of endosseous implants, low temperatures are required during preparation of the recipient site.

Table 1: Intergroup comparison of height of crestal bone between the group a and group B

	Group A		Group B		Significance of Difference Using Mann Whitney Test		
	Mean	S.D.	Mean	S.D.	Z	P value	Significance
Baseline	0.00	0.00	0.00	0.00	0.000	1.000	NS
3month	0.17	0.23	0.06	0.13	-1.610	0.107	NS
6month	0.70	0.22	0.17	0.16	-5.285	<0.001	S
9month	0.87	0.12	0.47	0.17	-5.229	<0.001	S

Graph 1: Intergroup comparison of height of crestal bone

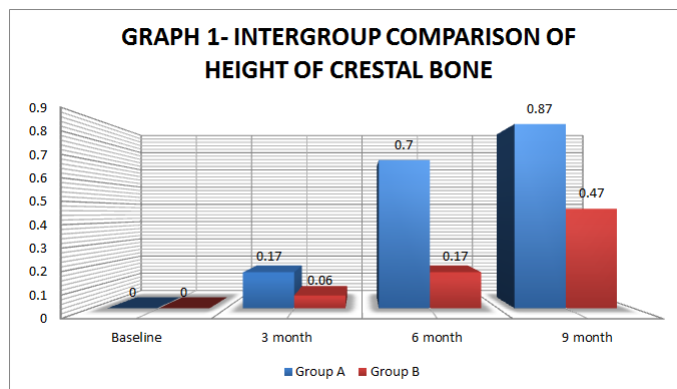


Table 2: Intergroup comparison of probing depth between the group a and group B

	Group A		Group B		Significance of Difference Using Mann Whitney Test		
	Mean	S.D.	Mean	S.D.	Z	P value	Significance
Baseline	1.00	0.00	1.00	0.00	0.000	1.000	NS
3month	1.19	0.27	1.01	0.05	-2.687	0.007	S
6month	1.41	0.34	1.12	0.17	-2.856	0.004	S

Graph 2: Intergroup comparison of probing depth

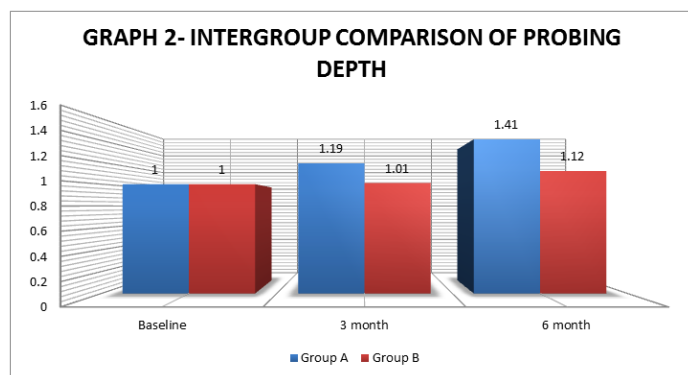
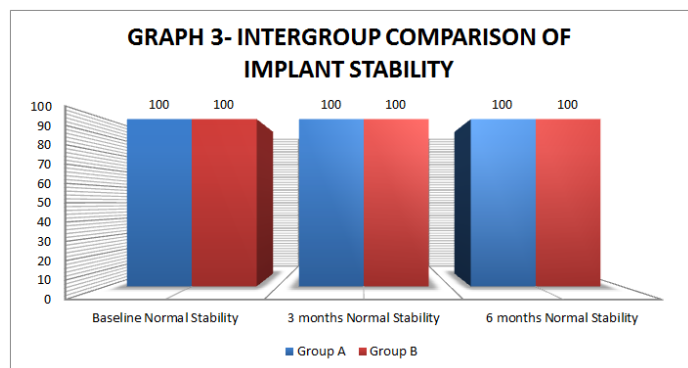


Table 3: Implant stability between the group a and group B

	Group A	Group B	Significance of Difference Using Chi-square test		
			Chi-square value	P value	Significance
Implant Stability	N (%)	N (%)			
Baseline Normal Stability	20 (100)	20 (100)	-	-	-
3 months Normal Stability	20 (100)	20 (100)	-	-	-
6 months Normal Stability	20 (100)	20 (100)	-	-	-

Graph 3: Intergroup comparison of implant stability



**Conclusion**

The present study depicted that implants placed with conventional method may be at higher risk than implants placed with low speed drilling without irrigation and the soft and hard tissue healing outcome might be better when

placing implants with the use of this method. Based on the results of this study, it can be concluded that the rationale for the implant placement at low speed drilling without irrigation favors rapid soft tissue regeneration, diminishes crestal/vertical bone loss with reduced probing depth, which helps in achieving better patient acceptance.

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**Legend Figure**



Figure 1: Incision given



Figure 2: Full thickness flap raised

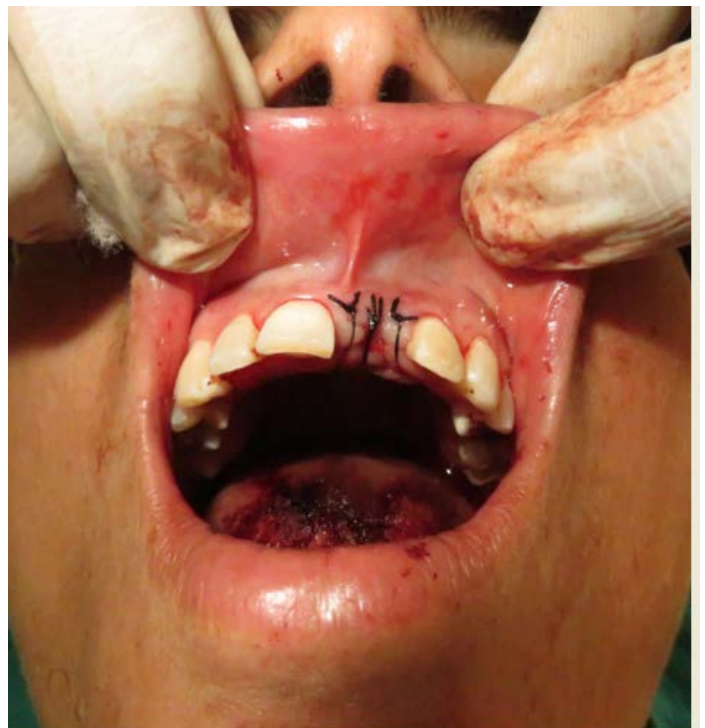


Figure 3: Sutures placed

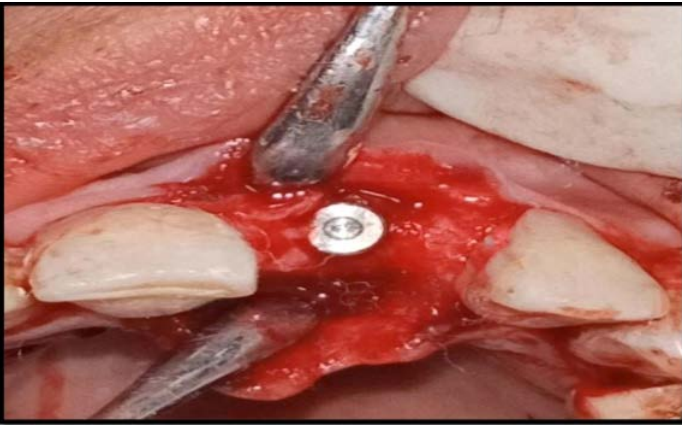


Figure 4: Implant placed

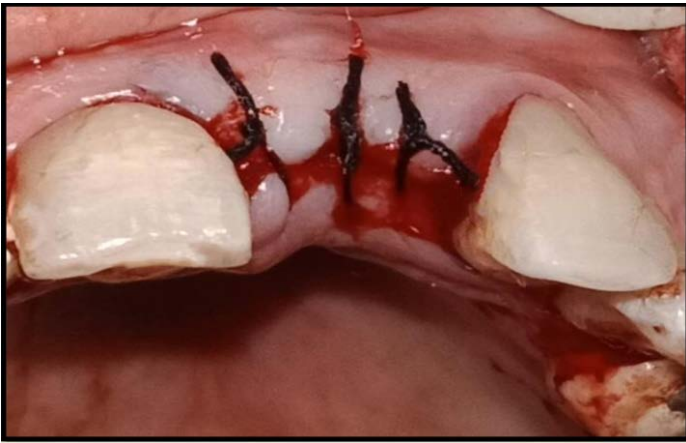


Figure 5: Sutures Given