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# The effects of bone grafting on immediate implant primary stability in a simulated model

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## Introduction

**Research question:** Does bone grafting contributes to the overall success of dental implants immediately placed in tooth extraction sockets?

**Aims and Objectives:**

- 1) To evaluate the primary stability of dental implants placed in extraction sockets with or without bone graft.
- 2) To assess the effect of different bone graft materials on primary stability.

**Hypothesis:** Bone grafting affects primary stability of the implants placed immediately in extraction sockets.

# Material and methods

In vitro experimentation with a sample size of 20 osteotomies (2.75 * 10mm) using porcine ribs to simulate clinical conditions.

- Root form endosseous Implant (3.8 x 10mm)

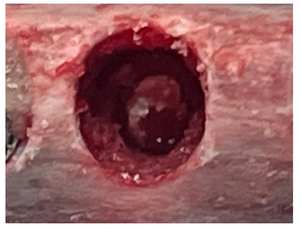
- The RFA equipment

- Alloplast putty

- Xenograft particulate

- 6 mm bone Trephine

The extraction socket defects were created modifying a previously published technique. 6mm of bone was removed coronally from porcine ribs simulating the socket defect.[4]



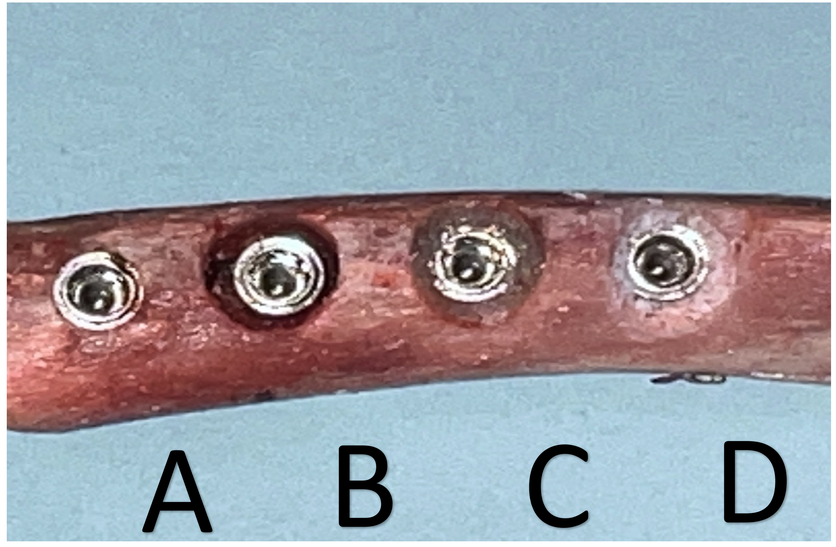



Figure1:
**(A)** No socket defect (Control) (Gc);
**(B)** Socket defect with no bone graft (Test) (GT0);
**(C)** Socket defect filled with Nova bone putty (GTa);
**(D)** Socket defect filled with Bio Oss particulate bone graft (GTb)

# Data Analysis

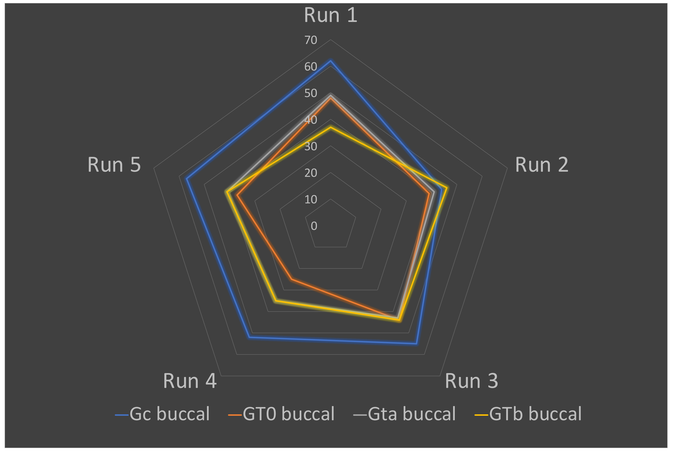



Figure 1: Spider diagram depicting ISQ on buccal aspect.

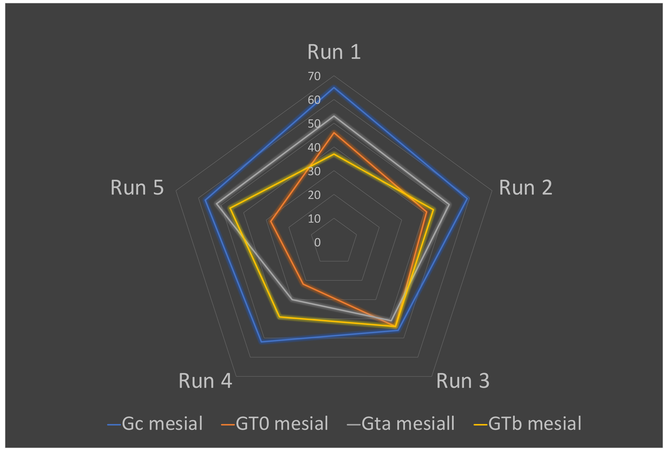



Figure 2: Spider diagram depicting ISQ on mesial aspect.

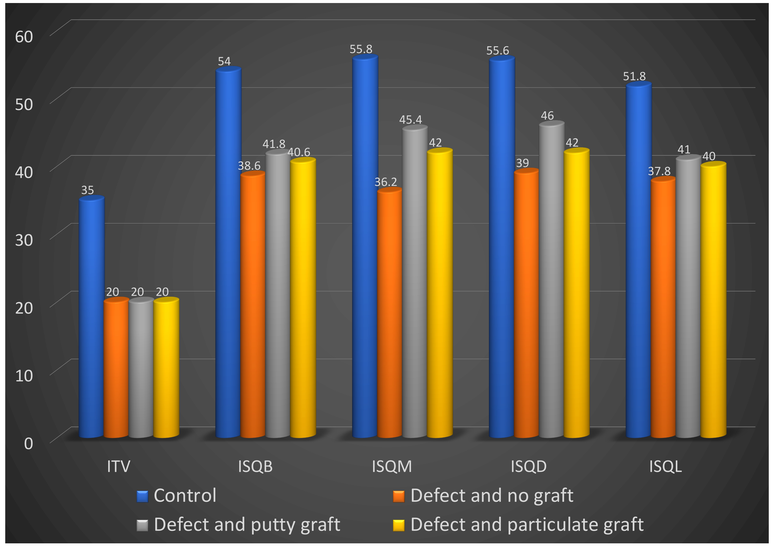



Figure 5: Bar chart comparing ISQ among different groups.

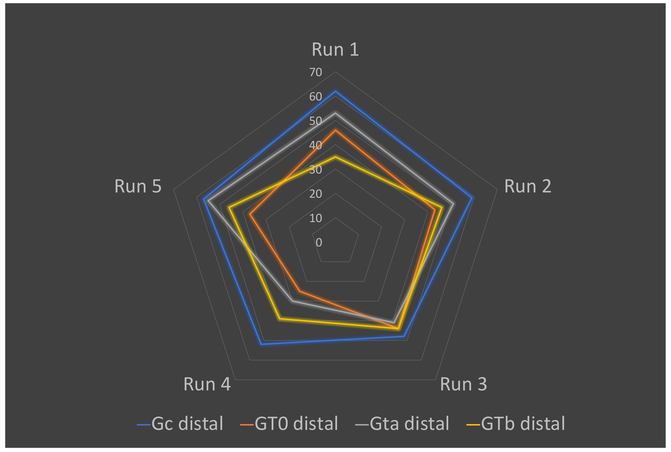



Figure 3: Spider diagram depicting ISQ on distal aspect.

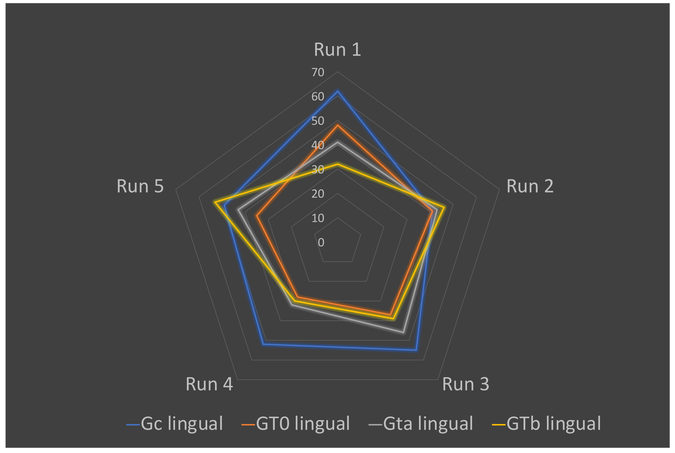



Figure 4: Spider diagram depicting ISQ on lingual aspect.

# Results

The non-parametric data was tested via Mann Whitney U test.

| Initial torque value and ISQ | | | | | | |
|---|---|---|---|---|---|---|
| GROUP | | ITV | ISQ (Buccal) | ISQ (Mesial) | ISQ (Distal) | ISQ(Lingual) |
| Control (N=5) | Mean | 35.00 | 54.00 | 55.80 | 55.60 | 51.80 |
| | SD | .000 | 6.671 | 7.190 | 5.595 | 7.727 |
| Defect and no graft (N=5) | Mean | 20.00 | 38.60 | 36.20 | 39.00 | 37.80 |
| | SD | .000 | 8.735 | 10.592 | 8.515 | 7.396 |
| Defect and putty (N=5) | Mean | 20.00 | 41.80 | 45.40 | 46.00 | 41.00 |
| | SD | .000 | 5.020 | 9.864 | 10.440 | 5.339 |
| Defect and particulate graft (N=5) | Mean | 20.00 | 40.60 | 42.00 | 42.00 | 40.00 |
| | SD | .000 | 4.615 | 3.808 | 4.848 | 9.618 |
| Total | Mean | 23.75 | 43.75 | 44.85 | 45.65 | 42.65 |
| | SD | 6.664 | 8.571 | 10.559 | 9.538 | 8.964 |

There was no statistically significant difference between the groups, however, highest ISQ values were observed in all putty groups.

| Comparison among groups: Mann Whitney U test | | | | | |
|---|---|---|---|---|---|
| | GROUP | N | Mean Rank | Sum of Ranks | P value |
| ISQ (Buccal) | Defect and no graft | 5 | 5.00 | 25.00 | 0.60 |
| | Defect and putty graft | 5 | 6.00 | 30.00 | |
| | Defect and no graft | 5 | 5.40 | 27.00 | 0.91 |
| | Defect and particulate graft | 5 | 5.60 | 28.00 | |
| | Defect and putty graft | 5 | 5.70 | 28.50 | 0.83 |
| | Defect and particulate graft | 5 | 5.30 | 26.50 | |
| ISQ (Mesial) | Defect and no graft | 5 | 4.10 | 20.50 | 0.14 |
| | Defect and putty graft | 5 | 6.90 | 34.50 | |
| | Defect and no graft | 5 | 4.90 | 24.50 | 0.52 |
| | Defect and particulate graft | 5 | 6.10 | 30.50 | |
| | Defect and putty graft | 5 | 6.40 | 32.00 | 0.34 |
| | Defect and particulate graft | 5 | 4.60 | 23.00 | |
| ISQ (Distal) | Defect and no graft | 5 | 4.40 | 22.00 | 0.25 |
| | Defect and putty graft | 5 | 6.60 | 33.00 | |
| | Defect and no graft | 5 | 4.90 | 24.50 | 0.52 |
| | Defect and particulate graft | 5 | 6.10 | 30.50 | |
| | Defect and putty graft | 5 | 6.40 | 32.00 | 0.34 |
| | Defect and particulate graft | 5 | 4.60 | 23.00 | |
| ISQ (Lingual) | Defect and no graft | 5 | 4.70 | 23.50 | 0.40 |
| | Defect and putty graft | 5 | 6.30 | 31.50 | |
| | Defect and no graft | 5 | 5.20 | 26.00 | 0.75 |
| | Defect and particulate graft | 5 | 5.80 | 29.00 | |
| | Defect and putty graft | 5 | 5.80 | 29.00 | 0.75 |
| | Defect and particulate graft | 5 | 5.20 | 26.00 | |

# Conclusion

There was an increase in the stability of the implant with putty graft more than particulate graft or when no graft was placed in the defect. However, the outcome was not statistically significant. Further studies are needed to make a definitive conclusion.

## Acknowledgement

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