

# IN VITRO EVALUTATION OF THE ABILITY OF A NEW MICROSREW TO HOLD ORTHODONTIC ARCHWIRES

Arveda N, Locatelli R, Lombardo L, Siciliani G

## Introduction

In recent years, orthodontic mini-implants have become very popular. New kinds of mechanics and treatment options became possible due to the new anchorage quality<sup>1,3</sup>.

The aim of this research was to test the ability of a new skeletal anchorage device featuring an innovative wire locking system inside the implant head to clamp orthodontic wires of different size, cross-section and material.

## Material and Methods

### Miniscrew description

It is called FIRMA PLUS, and it presents a self-ligating head. It was designed for self-ligating anchorage and blocking of rectangular, square AND round archwires, as long as their dimensions do not exceed 0.018x0.025 inch (Fig 1).

First the wire is aligned with respect to the long axis of the slot. After it can be easily slipped inside the niche using an "L-shaped" movement.

Inside the implant head there is a small screw, and this can be used to quickly, simply and firmly clamp the wire by means of clockwise rotation of a screwdriver (Fig 2).

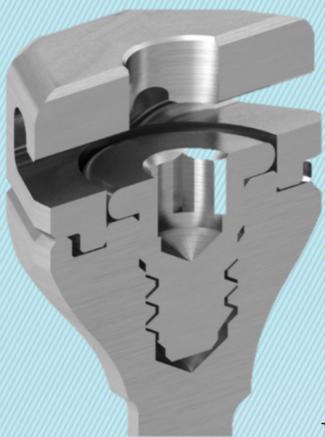


Figure 1



Figure 2

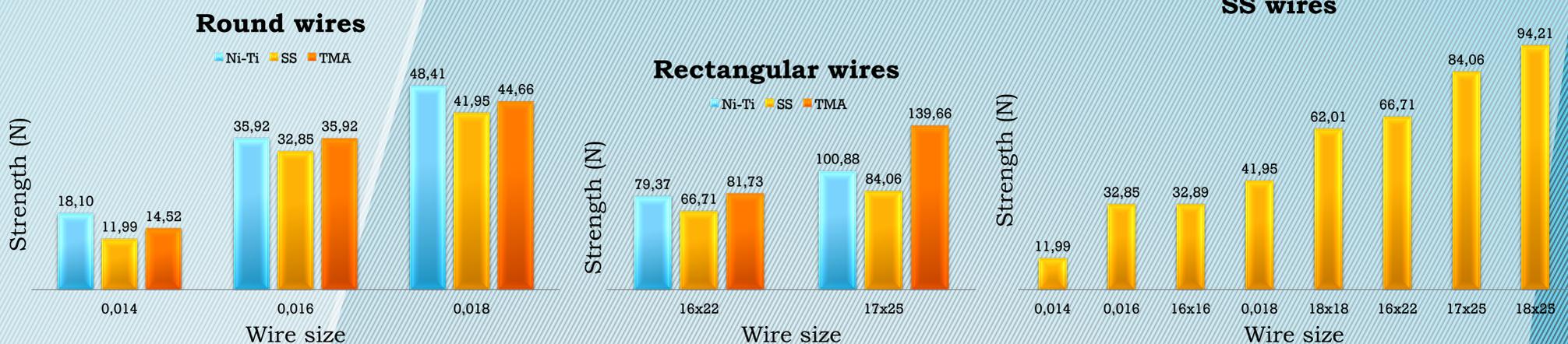


## In vitro evaluation

Nine miniscrews (diameter 1.8 x 8 mm), from three different production batches, were placed in synthetic bone blocks (Cellular Rigid Polyurethane Foam and Solid Rigid Polyurethane Foam, Sawbones)<sup>2</sup>. To ensure optimal control of insertional torque a placement insertion torque was established using an electric micromotor calibrated to 50.0 Ncm and 20 rounds/minute. The different wires were fixed on the head of the miniscrews thanks to the new self-ligating system using a dynamometric torque driver calibrated to 15.0 Ncm torque.

All of the wires were tested by performing pullout test through Instron Machine 4467 in order to find the maximum locking wire. We tested NiTi, TMA and SS wires from 0.014 to 0.018 x 0.025 inch. Each wire was tested on three miniscrews. The pullout test was performed three times on each miniscrew for a total of 153 measurements.

## Results



## Conclusion

- ▶ The efficacy of the new self-ligating locking system is very high.
- ▶ The strength of the locking system was directly proportional to the wire size which was the most important factor that influences the values.
- ▶ The geometry of the wires did not influence the results.
- ▶ A statistically significant reduction in pullout force was found between the SS wires and the other wires.
- ▶ TMA and Ni-Ti wires showed similar values.

Thanks to the new self-ligating locking system, the miniscrew FIRMA PLUS represents a simple and versatile device that finds great indications especially in cases of distal movement, uprighing and teeth disimpaction.

## Bibliografia

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