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An evaluation of two types of nickel-titanium wires in terms of micromorphology and nickel ions release following oral environment exposure

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Aim: This study aimed to compare superelastic and heat-activated nickel-titanium orthodontic wires surface morphology and potential release of nickel ions following exposure to oral environment conditions.

Methodology: Twenty four 20-mm- length distal cuts of superelastic (NiTi Force 1) and twenty four 20-mm- length distal cuts of heat activated (Therma – Ti lite) nickel titanium wires (American Orthodontics, Sheboygan, Wisconsin, USA) were divided into two equal groups: 12 wire segments passively exposed to oral environment for 1 month. Scanning electron microscopy were used to analyze surface morphology of the wires which were immersed in artificial saliva for 1 month to determine potential nickel ions release by means of atomic absorption spectrophotometer.

Results: Heat-activated nickel-titanium (NiTi) were rougher than superelastic wires, and both types of wires released almost the same amount of Ni ions. After clinical exposure more surface roughness was recorded for superelastic NiTi wires and heat-activated NiTi wires. However, retrieved superelastic NiTi wires released less Ni ions in artificial saliva after clinical exposure, and the same result was recorded regarding heat-activated wires.

Conclusions: Both types of NiTi wires were obviously affected by oral environment conditions, their surface roughness significantly increased while the amount of the released Ni ions significantly declined.

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