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CLINICAL INNOVATIONS

Effects of Osseodensification on Astra TX and EV implant systems

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Background

Success of a dental implant is largely influenced by the initial stability generated at its time of placement. Numerous studies have attempted to further identify the factors that influence primary stability. Insertion torque and resonance frequency analysis and objective values that can be measured and have been proven to show a direct relationship with initial stability.

Background and Aim

The aim of this study was to determine if a new drilling system based on osseodensification, had any effect on the primary stability and healing outcomes of 2 different implant systems of different macrogeometries, but similar surface treatments.

Methods and Materials

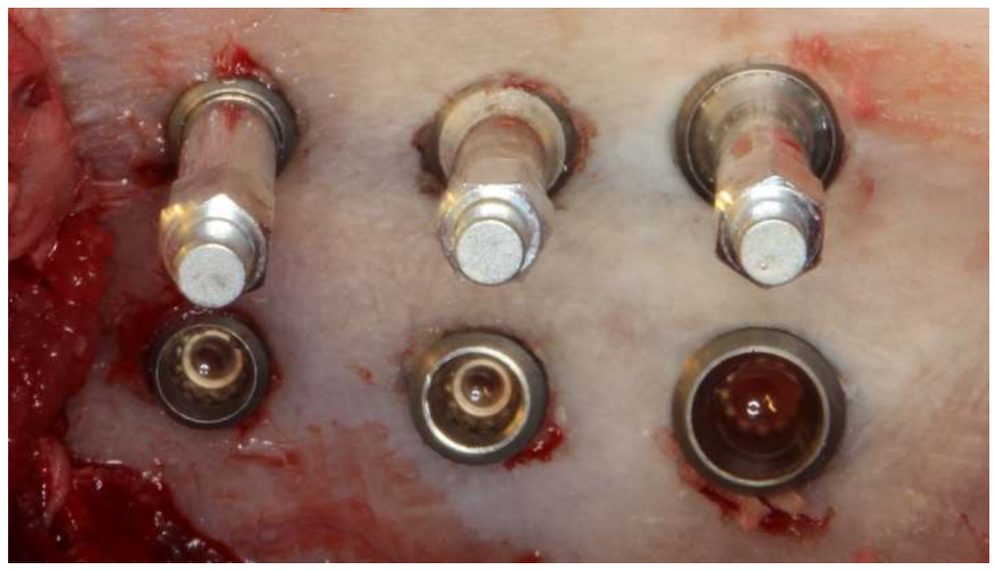
Two types of implants, Astra TX (Dentply Sirona) and Astra EV (Dentply Sirona), were included in this study. Six male sheep had 3 implants of each type placed into the hip bilaterally. Three different osteotomy preparations were made for each implant. One using the manufactured recommended drilling protocols, denoted regular or “R”. One using the Densah protocol (Versah, Jackson, MI, USA) with a 2.0 mm pilot, 2.8 mm, and 3.8 mm multi fluted burs in a clockwise rotation (CW), as well as in a counterclockwise rotation (CCW), or osseodensification. Insertion torque and RFA was measured at placement and sites were left to heal for 6 weeks. At 6 weeks animals were sacrificed and samples were prepared for histology.

Results

Significant differences in insertion torque and RFA among the three drilling protocols were observed, with the Versah drills showing substantially higher values. No difference was observed between the two implant systems in regard to insertion torque and RFA. Minimal difference was shown between the R protocol and Versah protocol for the TX system in terms of BIC and BAFO. However, the EV system showed a large difference between the R protocol and Versah system in terms of BIC and BAFO with the Densah system being substantially higher in both categories. The EV system also had much higher BIC and BAFO in all drilling protocols compared to the TX system. Significantly more autogenous bone chip debris in direct contact with the implant surface were observed with Versah drilling protocols.

Conclusions

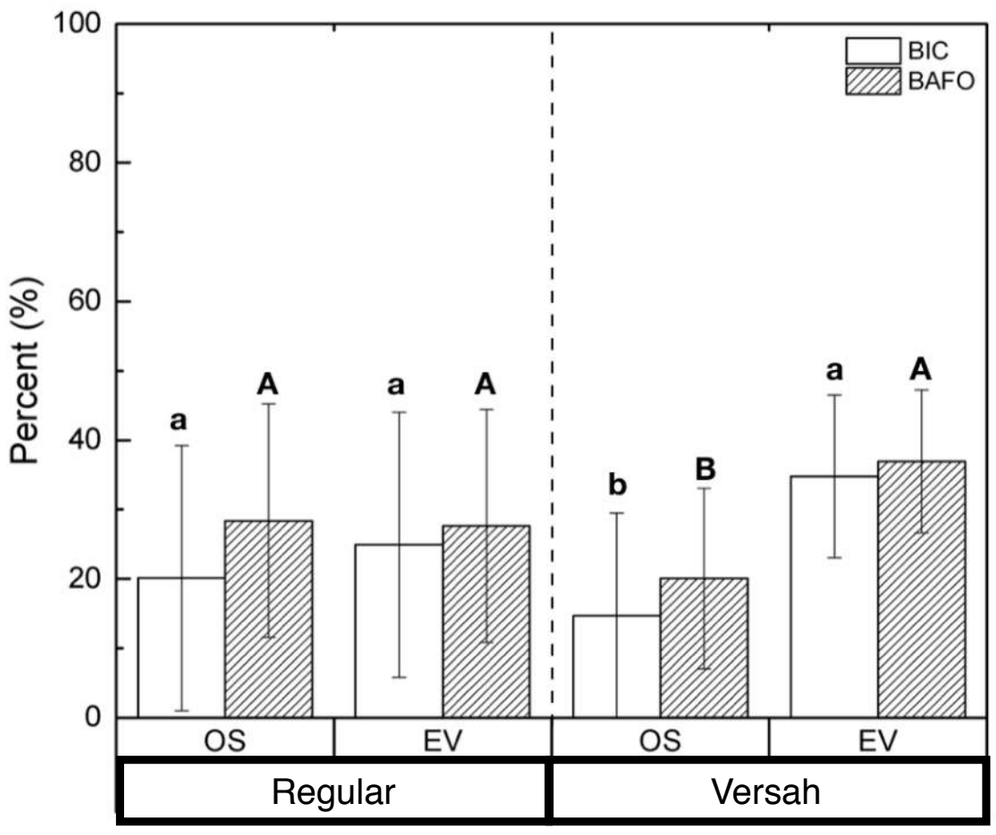
The conclusions of this study are that the osseodensification created by the Densah drilling protocol provides a substantially higher insertion torque and RFA compared to the manufacturer recommended protocol, leading to improved clinical performance. Also, that Astra EV has superior osseointegration capability compared to the Astra TX with Densah protocols.



Insertion Torque	Astra EV			Astra TX		
	Regular	Densah CW	Densah CCW	Regular	Densah CW	Densah CCW
Sheep #1	10	50	90	0	40	90
Sheep #2	15	60	68	15	60	70
Sheep #3	20	50	100	20	50	100
Sheep #4	20	80	100	30	85	90
Sheep #5	10	55	90	10	50	100
Sheep #6	25	70	100	15	45	100
Mean	**16.7**	**60.8**	**91.3**	**15**	**55**	**91.6**
Standard Deviation	6.06	12.0	12.44	10	16.12	11.69

RFA Values	Astra EV						Astra TX					
	Regular		Densah CW		Densah CCW		Regular		Densah CW		Densah CCW	
Sheep #1	30	36	74	68	85	83	28	32	60	62	74	68
Sheep #2	46	48	81	83	82	82	36	43	74	80	76	82
Sheep #3	32	42	78	74	79	76	38	32	75	73	80	79
Sheep #4	34	38	76	73	84	82	32	30	78	72	82	78
Sheep #5	38	36	72	75	82	78	48	42	72	74	86	80
Sheep #6	30	32	76	72	78	76	44	46	76	72	82	78
Mean	**37.6**		**74.4**		**78.8**		**37.6**		**72.2**		**72.8**	
Std Deviation	5.94		4.09		3.06		6.84		5.85		4.61	

BIC and BAFO for Astra EV and TX with Drilling Protocol



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