

Available Lateral Surface Area and Bone Loss of Tapered Short Implants

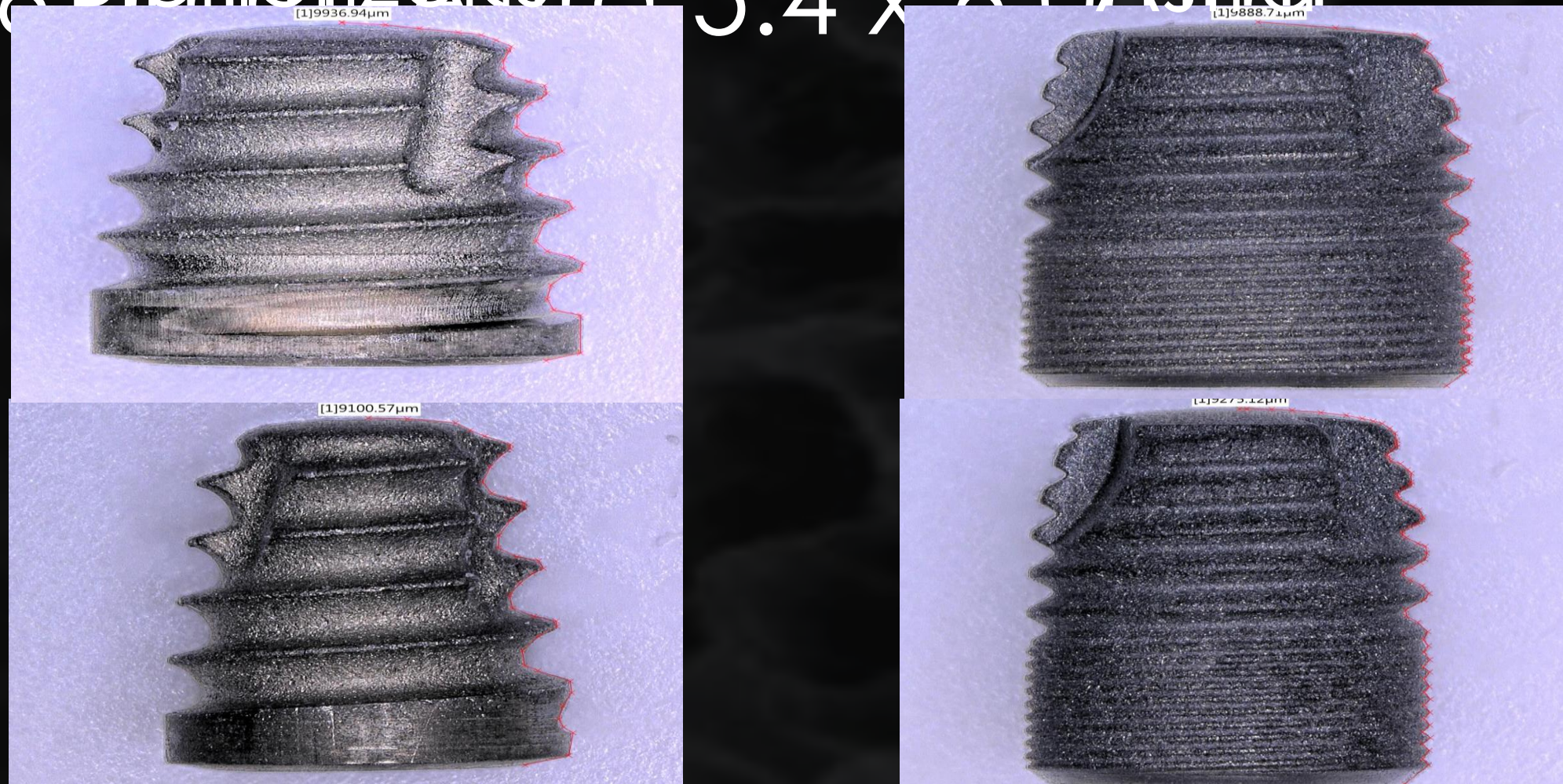
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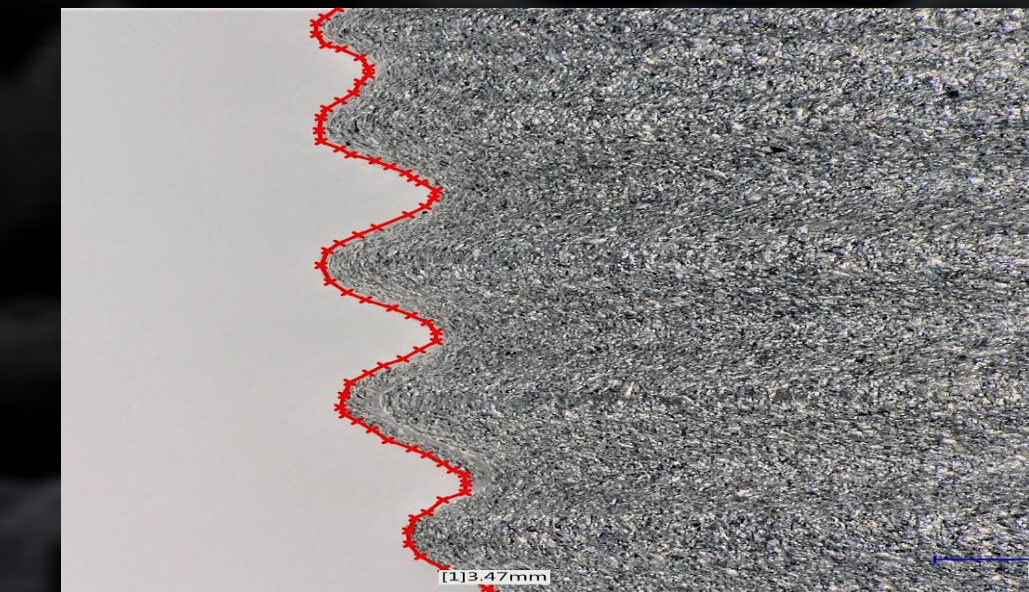
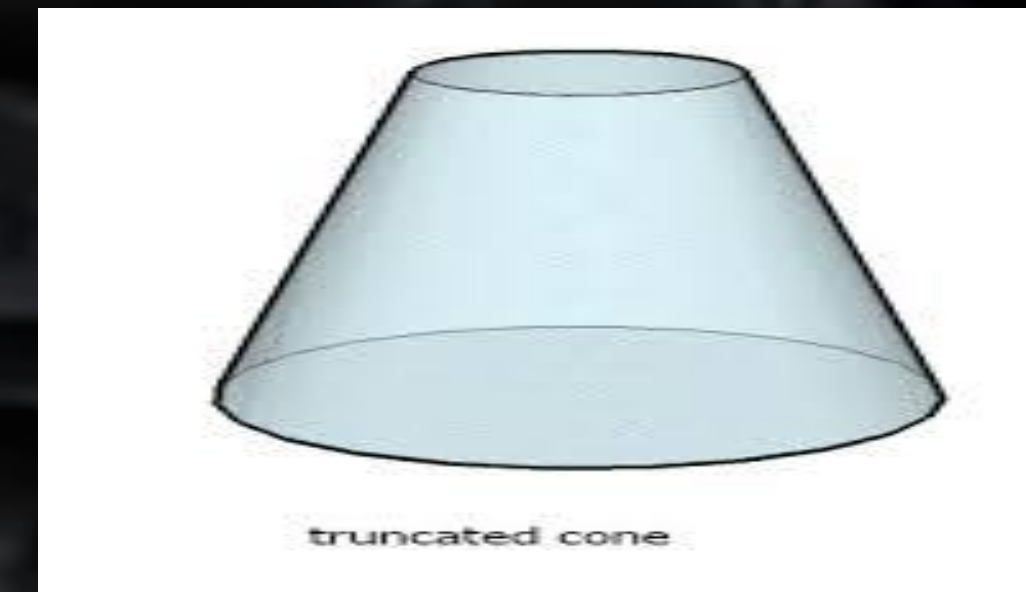
AIMS: To determine the lateral surface area (LSA) of Tapered Short Implants and to evaluate the impact of bone loss on the LSA of Tapered Short Implants available for osseointegration.

MATERIALS AND METHODS: Four Tapered Short Implants from 2 different implant systems were compared.

This includes the following implants: (BioHorizons 5.8 x 6.0mm; BioHorizons 4.6 x 6.0mm, Astra 4.8mm x 6.0mm, Astra 5.4 x 6.0mm)



A metrology digital microscope (Keyence VHX-6000), was used to scan the horizontal and vertical axis of the implants. The scanning parameters were vertical and horizontal steps of 5µm with fully automated movement. The multi-point tool was activated to evaluate the implant dimensions.

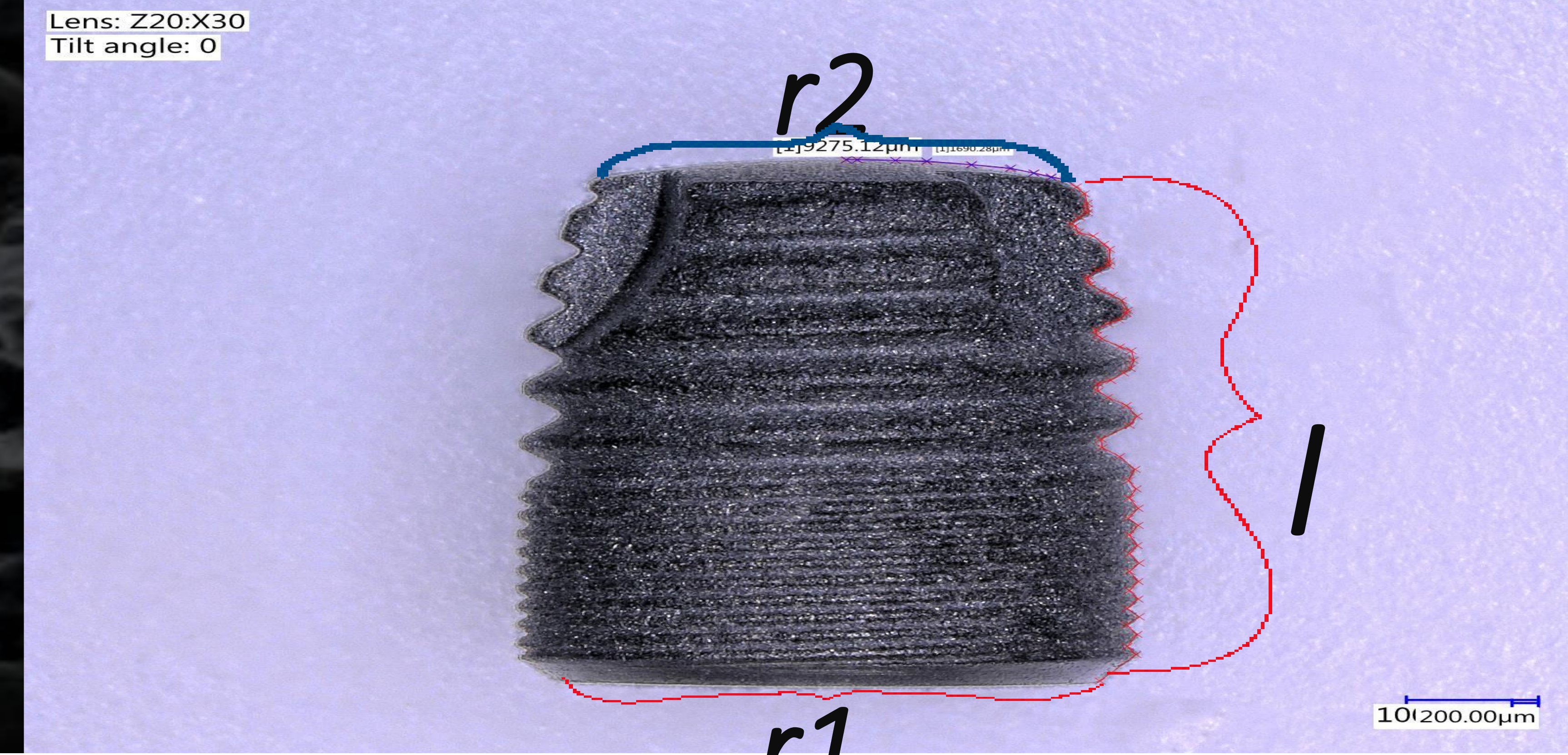


LSA plus the apical circular area of the implants were calculated with the formula:

$$LSA = (\pi l(r1 + r2)) + (\pi(r2^2))$$

Where $\pi=3.141592653589793238$; $r1$ = Coronal Radius of the implant, $r2$ =Apical Radius of the implant, and l = Slant Height of the implant

The length of each short implant was measured at 30X or 50x magnification. The edge detection tool was activated. Manual tracing was used to find the Slant Height (l), Coronal radius ($r1$), and Apical ($r2$) radius. Plus, the ($r1$) and (l) at -1mm, -2mm, -3mm vertically from the most



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MATERIALS AND METHODS:

Afterward, verticle bone loss of 1mm, 2mm, and 3mm was included for new calculations. Tables with the values are shown here assuming 100%, 70%, and 50% of bone to implant contact (BIC).

Next, Bar Charts were produced to show the impact of vertical bone loss in the amount of 1mm, 2mm, and 3mm on each implants LSA assuming 100%,70%, and 50% BIC.

RESULTS:

100% BIC

GROUP	LSA (mm²)	LSA-1mm (mm²)	LSA-2mm (mm²)	LSA-3mm (mm²)
Biohorizons 5.8 x 6.0mm	125.35	100.23	75.64	53.44
Biohorizons 4.6 x 6.0mm	94.07	76.19	57.81	40.88
Astra 4.8mm x 6.0mm	112.09	93.75	78.12	59.56
Astra 5.4 x 6.0mm	127.35	104.89	83.71	63.9

RESULTS:

70% BIC

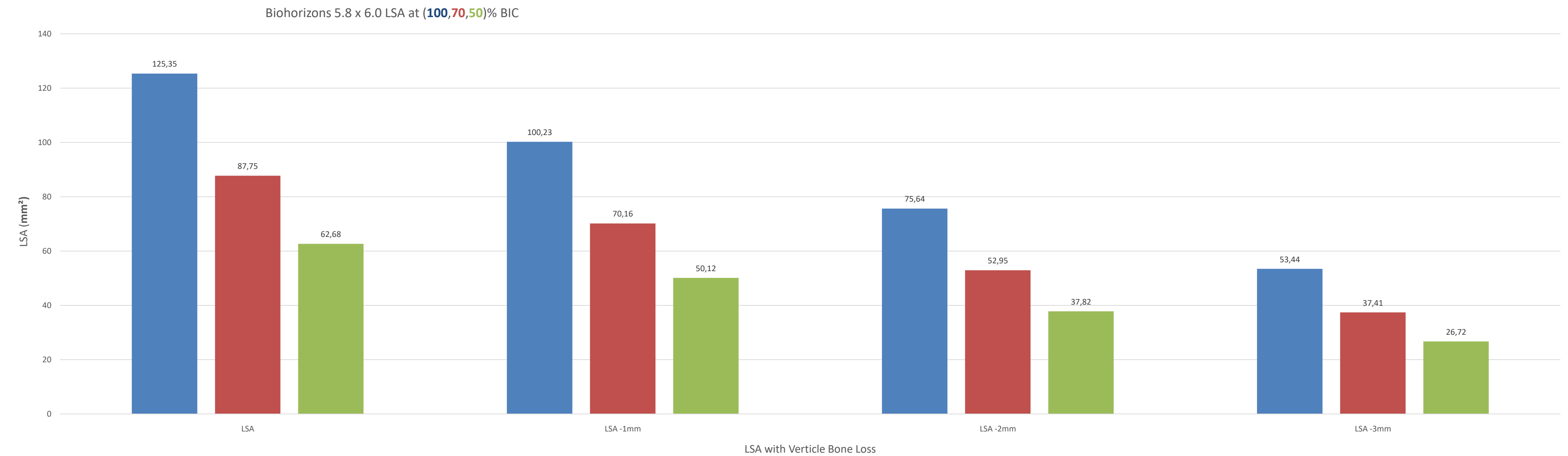
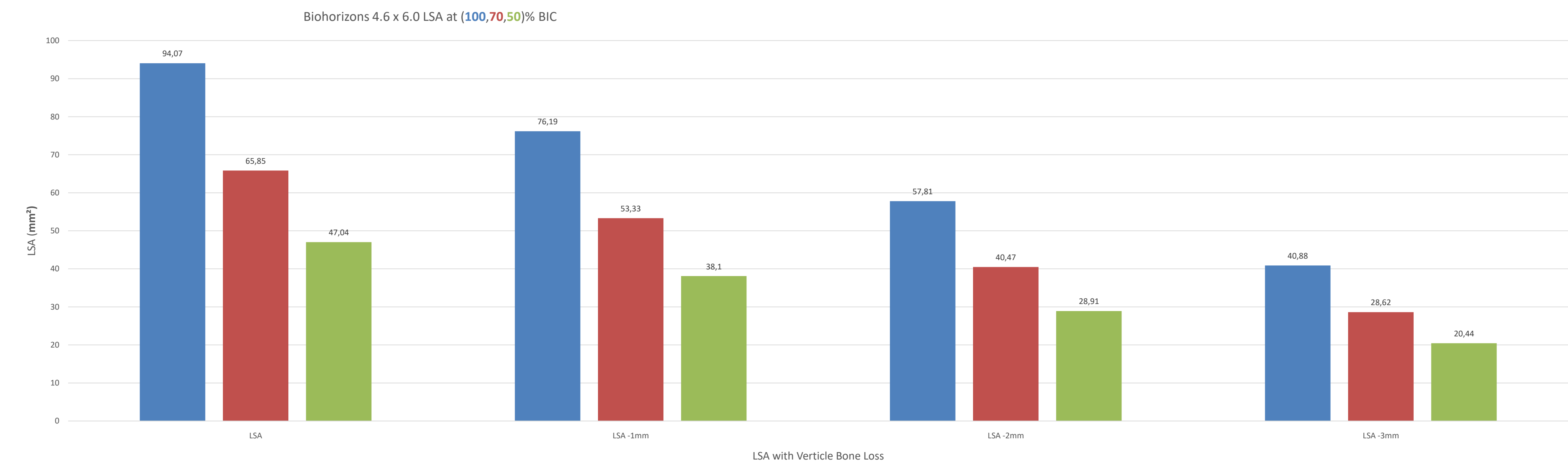
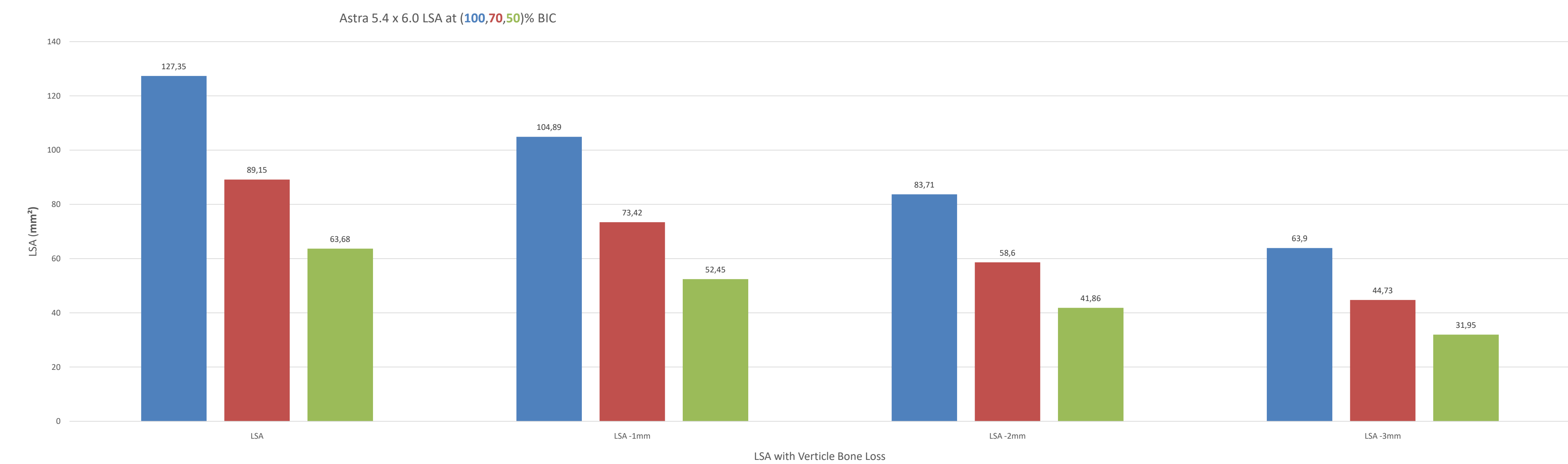
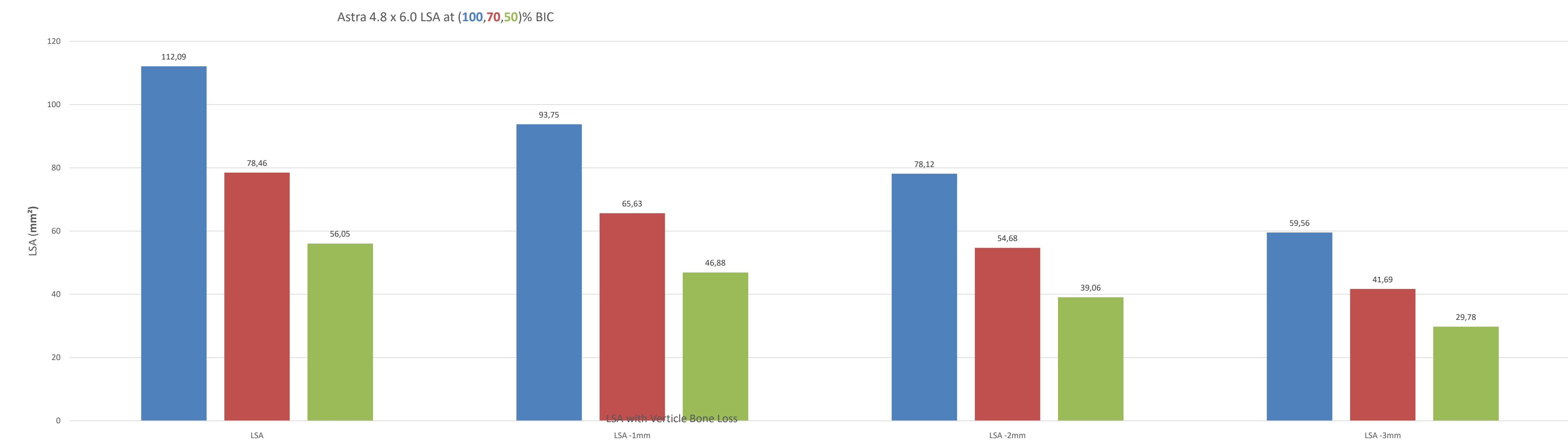
GROUP	LSA (mm²)	LSA-1mm (mm²)	LSA-2mm (mm²)	LSA-3mm (mm²)
Biohorizons 5.8 x 6.0mm	87.75	70.16	52.95	37.41
Biohorizons 4.6 x 6.0mm	65.85	53.33	40.47	28.62
Astra 4.8mm x 6.0mm	78.46	65.63	54.68	41.69
Astra 5.4 x 6.0mm	89.15	73.42	58.6	44.73

50% BIC

GROUP	LSA (mm²)	LSA-1mm (mm²)	LSA-2mm (mm²)	LSA-3mm (mm²)
Biohorizons 5.8 x 6.0mm	73.39	60.16	47.09	26.72
Biohorizons 4.6 x 6.0mm	51.32	42.11	32.47	23.7
Astra 4.8mm x 6.0mm	63.12	53.67	45.71	36.07
Astra 5.4 x 6.0mm	76.12	64.355	53.31	42.82

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RESULTS



CONCLUSIONS

The dimensions of short implants and their geometry influence the LSA. The LSA of short implants is severely affected assuming 70%, or 50% of BIC. When additional 1mm, 2mm, and 3mm levels of verticle bone loss occur, the