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Appendix

TABLE E-1 Sensitivity, Specificity, and Accuracy of the Fracture Characteristics Based on Different Preoperative Planning Systems*

Question	Sensitivity (95% CI)	Specificity (95% CI)	Accuracy (95% CI)
Is the greater tuberosity displaced?			
Conventional group†	0.91 (0.76-0.98)	0.95 (0.75-1.00)	0.92 (0.82-0.98)
3D printing group‡	0.89 (0.67-0.99)	0.85 (0.55-0.98)	0.88 (0.71-0.96)
Virtual surgical group§	0.88 (0.69-0.97)	0.86 (0.64-0.97)	0.87 (0.74-0.95)
Is the humeral head split?			
Conventional group†	0.88 (0.72-0.97)	0.90 (0.68-0.99)	0.89 (0.77-0.96)
3D printing group‡	0.95 (0.74-1.00)	0.85 (0.55-0.98)	0.91 (0.75-0.98)
Virtual surgical group§	0.92 (0.74-0.99)	0.90 (0.70-0.99)	0.91 (0.79-0.98)
Is the arterial supply compromised?			
Conventional group†	0.85 (0.68-0.95)	0.85 (0.62-0.97)	0.85 (0.72-0.93)
3D printing group‡	0.89 (0.67-0.99)	0.92 (0.64-1.00)	0.91 (0.75-0.98)
Virtual surgical group§	0.92 (0.74-0.99)	0.86 (0.64-0.97)	0.89 (0.76-0.96)
Classification of fracture: 3 or 4-part?			
Conventional group†	0.94 (0.80-1.00)	0.85 (0.62-0.97)	0.91 (0.79-0.97)
3D printing group‡	0.84 (0.60-0.97)	0.92 (0.64-1.00)	0.88 (0.71-0.96)
Virtual surgical group§	0.88 (0.69-0.97)	0.90 (0.70-0.99)	0.89 (0.76-0.96)

*CI = confidence interval. †The values are based on a sample size of 53. ‡The values are based on a sample size of 32. §The values are based on a sample size of 46.

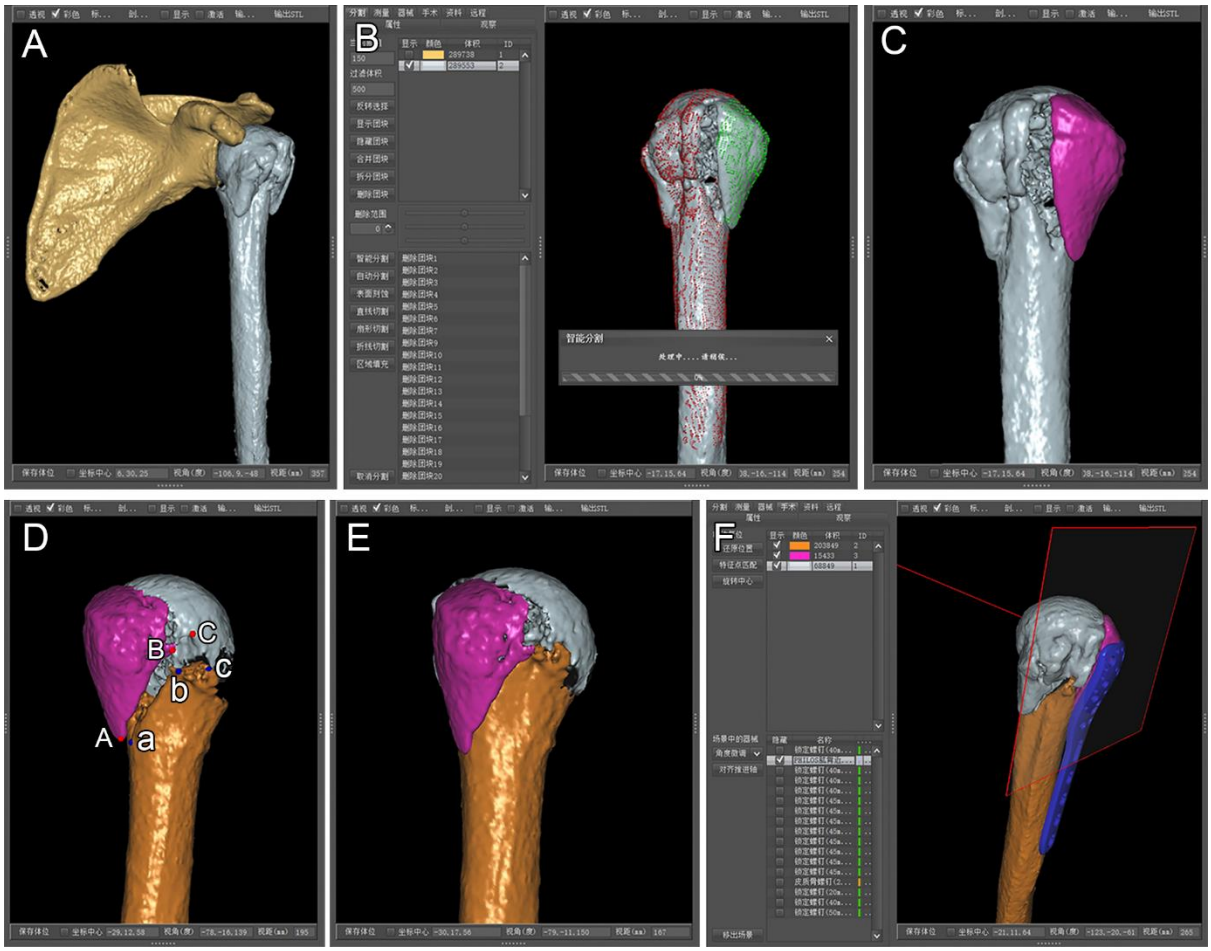

Fig. E-1

Figs. E-1A through E-1F The process of fracture reduction in preoperative planning with use of the computer-assisted virtual surgical technology. **Fig. E-1A** The fracture fragments of the proximal aspect of the humerus first appear as a whole and have the same color identification. **Fig. E-1B** Then, the fragment of the greater tuberosity and the rest were colored green and red, respectively, by the 3D interactive and automatic segmentation technology. After the "Enter" key was clicked, the software segmentation processing was started. **Fig. E-1C** The segmentation of fracture fragments was finished. **Figs. E-1D and E-1E** The virtual reduction was simulated by clicking "the key of sign 3 characteristic points match" (a functional key in the software) through the manual operation according to the 1-to-1 anatomical relationship between the proximal aspect (points A, B, and C) and the distal aspect (points a, b, and c). **Fig. E-1F** The bones were matched into correct anatomical positions automatically. According to the morphology of the fracture line, the suitable size of plate was selected and positioned in the appropriate place.

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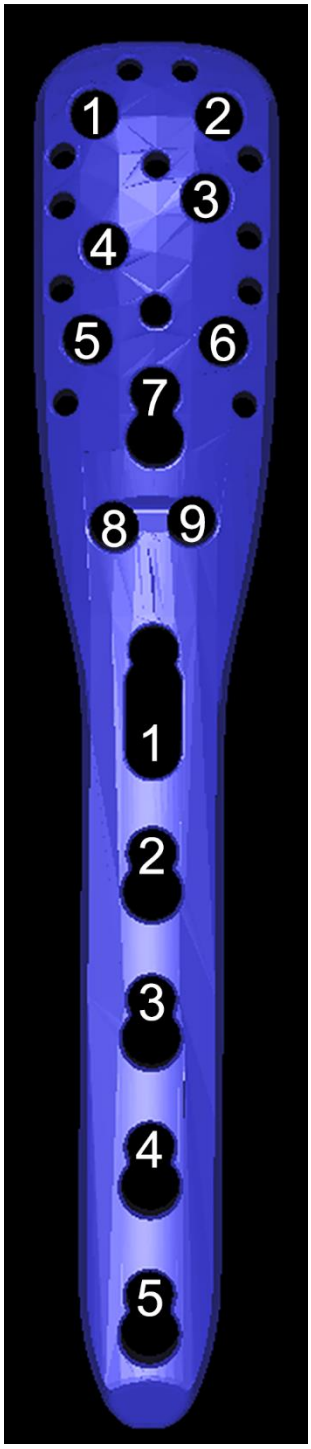

Fig. E-2

Distribution of the screw holes of the PHILOS plate (DePuy Synthes). The screw holes were numbered from 1 to 9 for the proximal aspect and from 1 to 5 for the distal aspect.