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Ziehm Vision RFD 3D:
Increasing surgical confidence
with intraoperative 3D information
in a pelvic fracture – A case study

As a result of a car accident, an 18-year-old male co-driver was severely injured and brought to the University Hospital Leipzig by helicopter. The multiple trauma included injuries such as craniocerebral injury, pneumothorax, soft tissue damages on the spleen, kidneys and adrenal gland, multiple rip fractures, unstable bilateral pelvic fracture, spinal fractures of transverse processes in L2 - L4 left and a left femur shaft fracture.

After performing intensive care measures and the placing an external fixator followed by a femoral nailing procedure, the second surgery for reconstruction of the pelvis was performed. The operating surgeon was Prof. Josten, assisted by PD Dr. Böhme. The C-arm used was a Ziehm Vision RFD 3D. The patient's weight was 70 kg at a height of 180 cm. Overall OR time took around 160 minutes.
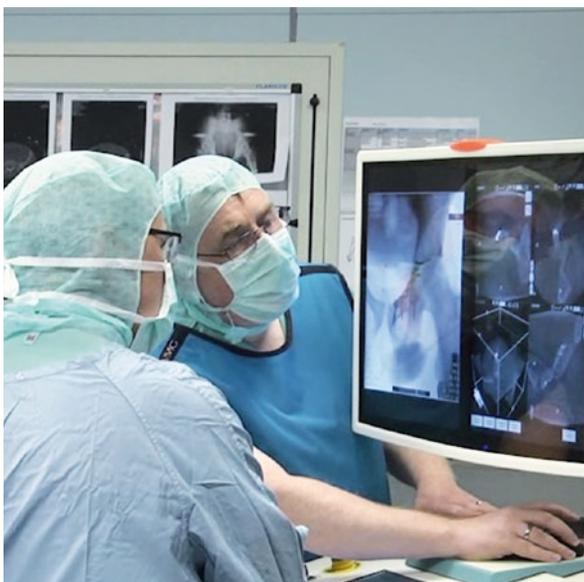

Fig. 1: Surgical team discussing images.

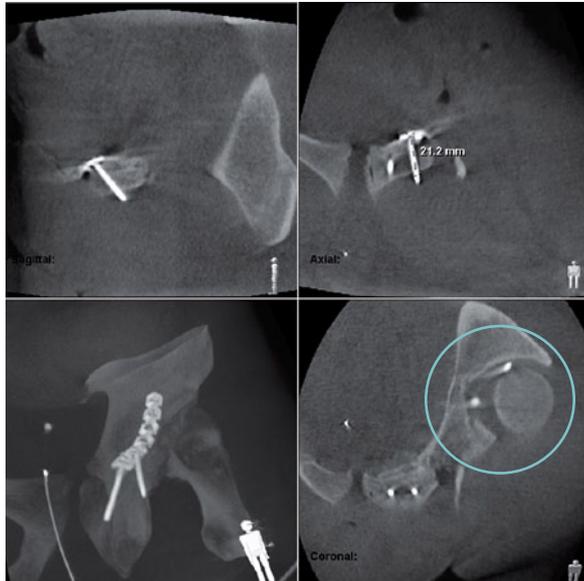
Fig. 2: Overview image of pelvic fracture.

Fig. 3: Image showing the screw in pubic ramus and the 6-hole plate, aligned on the medial screw.

Fig. 4: Image showing the corrected screw in pubic ramus and the 6-hole plate, aligned on the medial screw.

The surgical strategy consisted of a two-step approach

First off, an open initial stabilization of the pubis was performed via a modified Stoppa-approach with a 6-hole Titan reconstruction plate at the left and a 7.5 mm cannulated titan screw at the right pubic ramus. Multiple 2D projections in various axes were used to guide the insertion procedure.

The multiplanar reconstruction along the screw axis clearly showed that two screws had to be revised, as they were partially perforating the articular surface in the intra-articular space (marked in Fig. 3). One screw was replaced with a shorter variant, whereas for the second screw, the entry angle was corrected. A second intraoperative 3D scan confirmed the optimal implant positioning.
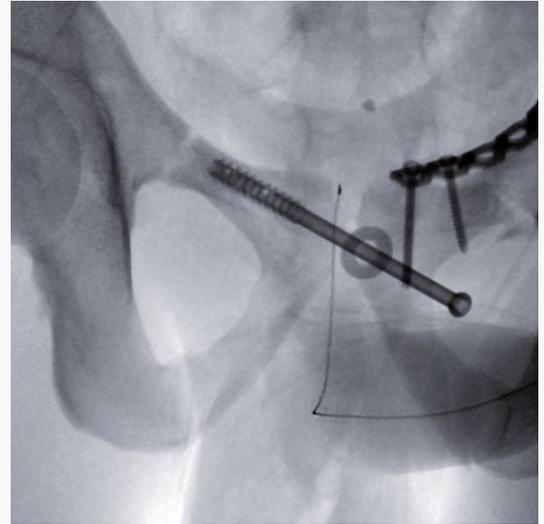
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Fig. 5 (left): C-arm positioning for outlet storage position
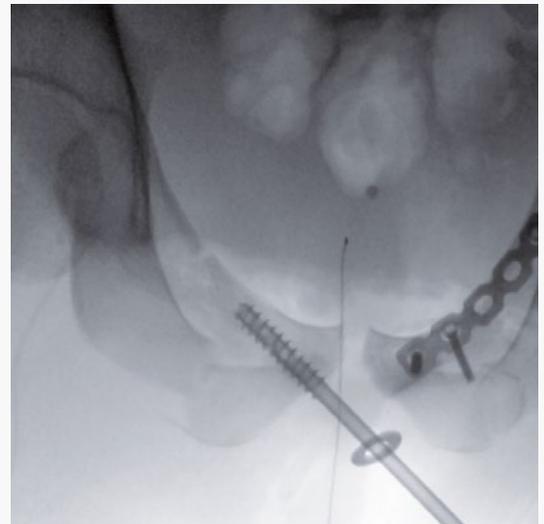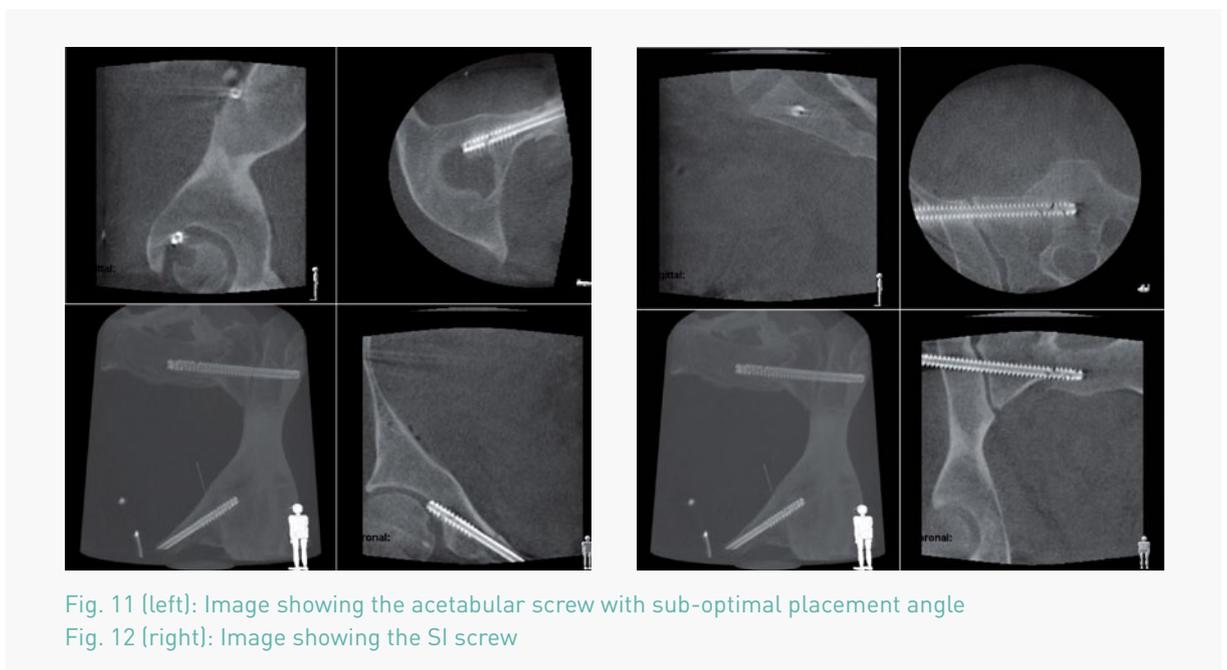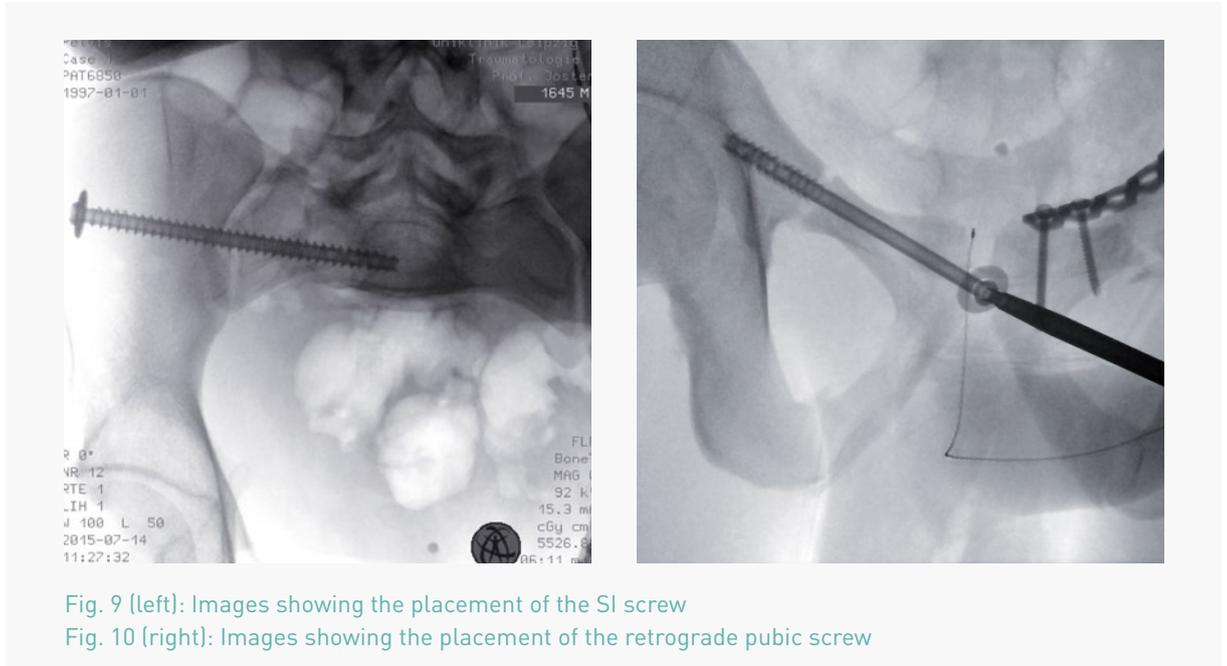Fig. 6 (right): 2D image of outlet orientation

Fig. 7 (left): C-arm positioning for inlet storage position
Fig. 8 (right): 2D image of inlet orientation

The second part of the surgery was a right-sided percutaneous triangular lumbopelvic support with one 7.5 mm cannulated titanium iliosacral screw in combination with a lumbopelvic distrac- tion spondylodesis. The screw placements were controlled multiple times switching from inlet to outlet projection.

For this part of the surgery, the usage of the motorized C-arm axis combined with the func- tionality to store both positions using the storage buttons on the Position Control Center was very helpful. Finding the exact same orientation again was possible with the simple push of a button.

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Fig. 9 (left): Images showing the placement of the SI screw
Fig. 10 (right): Images showing the placement of the retrograde pubic screw

Fig. 11 (left): Image showing the acetabular screw with sub-optimal placement angle
Fig. 12 (right): Image showing the SI screw

This reduced the typical trial and error cycle for adjusting the optimal projection in a non-motorized C-arm. This not only saved OR time, but also reduced dose exposure for the patient and clinical team.

After placement of a further pubic screw, another 3D scan was performed. This screw was revised intraoperatively, as the initial placement angle was not optimal.

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Fig. 13: The Position Control Center of the motorized C-arm allows simple storage of positions.
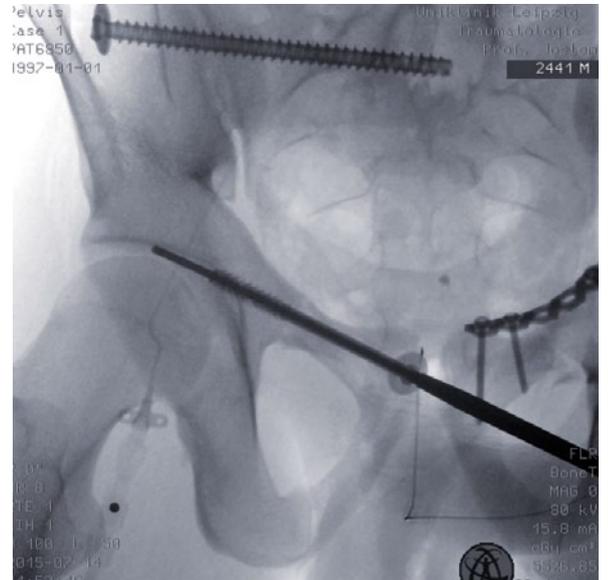

Fig. 14: Final 2D control image showing all implants in correct position.

Any of the 3D scans in the surgery could be performed in roughly five minutes, including draping the team leaving the OR, hyperoxygenation of the patient, breathing stop and image acquisition & reconstruction.

The outcome of the surgery was a successful near anatomical reconstruction.

The usage of 3D imaging with Ziehm Vision RFD 3D in this surgery clearly demonstrated the advantages such as:

– Intraoperatively correct implant
   positions within 5 minutes
– Controlling the complete pelvic case in
    one 3D volume
– Reductions in OR time and dose due to
   ability to find stored in- and outlet positions
– No need for postoperative CT

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