A new way to learn and analyze surgical interventions

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The ICUC app aims at enhancing learning. To reach this objective the technical details of surgical interventions are illustrated with high-quality close ups of a large number of consecutive cases from different centers. Modern information technology is instrumental in handling the large amount of data. The quality of the technical performances covers a large spectrum. Therefore, the cases are labelled as “recommended”, “to be discussed” and “not recommended”. Suboptimal results are included as they are an excellent source of learning. Frank expert commentaries are encouraged by preserving patient and hospital anonymity. Videoclips are added to illustrate special aspects, tricks and hints for the procedures. The free app allows both individual learning and the preparation of presentations. It can also be used in case discussions.

Technical details of surgical procedures are critical for individual training and development. E-learning tools now compete with conventional reading, congress visits and travel to foreign medical centers.

ICUC® presents a concept for a complete and continuous visualization of procedures in musculo-skeletal surgery using high-quality close-ups and animations.

During a predefined time period, all surgical procedures of predefined surgeons are documented in various centers by independent surgical specialists.

The anonymization of photo and video data when editing, ensures unbiased commentaries by recognized experts and allows the presentation of difficulties and errors.

The completeness of the documentation is verified and certified by an independent Auditor.

Efficient learning

The documents are uploaded to the iPad and are accessible for individual users free of charge. In combination with existing learning material the learning process is thus optimized.

Efficient learning is currently the target of scientific publications, webinars, congress visits, teaching videos, practical courses and visits to foreign centers.

Available case discussions, decision making algorithms, as well as detailed monographs of procedures in single anatomic regions, show that improvements are necessary and desirable. A realistic experience is made possible due to the high quality of the close ups. In addition the resulting “virtual visit” to the OR means that the user can learn without leaving the workplace and without cost.

The concept presented here, places specific emphasis on the completeness of the documentation. This includes the complete representation of difficulties and suboptimal results. These are expressions of the often unavoidable differences between an optimally planned procedure and the reality of the surgery carried out subsequently.

Some costly continuous medical education events can focus excessively on the application of specific technical devices. Modern teaching tools should aim to meet the specific needs and the personal learning rhythm of the learner and allow him to choose the time and place of learning as freely as possible.

The application presented avoids the above problems and in addition is more economical and convenient for the user. The cases presented in the app are part of different continuous prospective series. With a sufficiently large case series new knowledge extraction becomes possible.

A concrete example:

A surgeon is faced with a dislocated proximal femur fracture. The 75 year old patient has no relevant additional diseases (Fig. 1). He then checks AOSR for advice and tries to find a similar case in the ICUC® App.

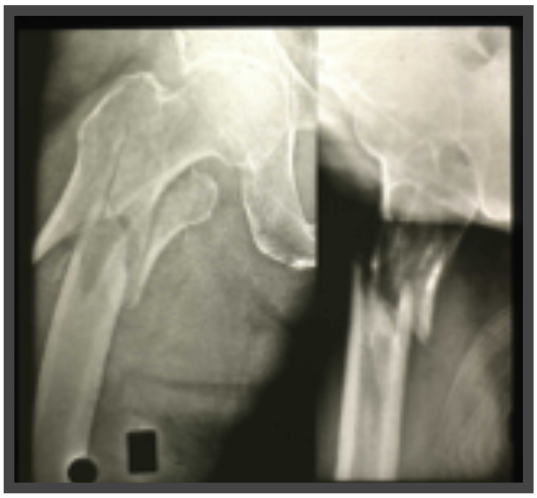


***Fig. 1 X-ray of a displaced 4 part trochanteric fracture**. 75 year old woman with a fragmented greater trochanter with a displaced lateral spike, displaced lesser trochanter.*

***Fig. 2 Postoperative X-ray** of case in Fig. 1.*

The surgeon must answer the following questions:

- Can the fracture be appropriately reduced using a fracture table?
- Is there a risk that the distal spike of the lateral proximal fragment will stick out laterally as in Fig. 2, where nailing was mistakenly started although the reduction was insufficient.
- Could the fragment be reduced and held by a cerclage?
- Is there a risk of secondary displacement of the lateral fragment during the introduction of a nail?
- How big a risk of further fragmentation of the lateral fragment is there by using a sliding hip screw?
- Is an additional Trochanter Buttress Plate needed when choosing a sliding hip screw?
- In general: pros and cons of different possible implants (nail, plates)?

Where can the surgeon find answers to these questions?

The consultation of the existing literature is time consuming and it is not easy to find answers with the necessary details.
Does the AO Surgery Reference help? Undoubtedly, valuable information is provided:
In the AO Surgical Reference the different options are listed and illustrated with high-quality diagrams and clinical pictures of individual cases.

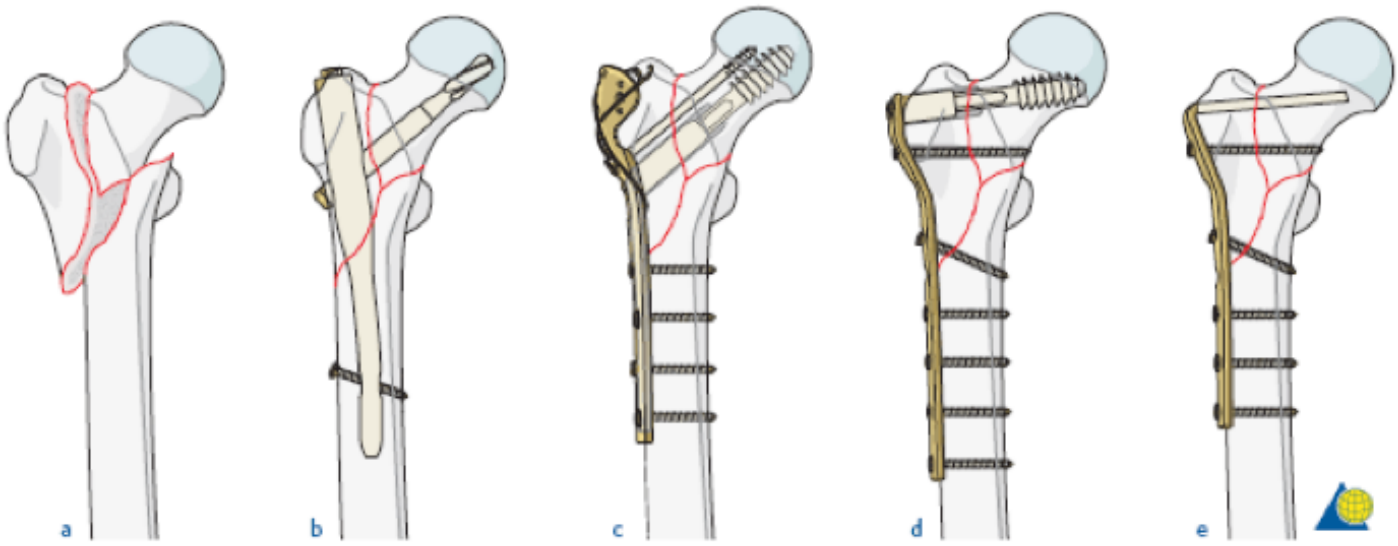


Fig. 3 Schematic drawings from AO Surgery Reference. *Different implant options are shown.*

In contrast, the user of the ICUC app may scroll through a large number of clinical images, and study corresponding to his or her own needs.
Alternatively, the surgeon could try to find a similar case to Fig. 1 and Fig. 2 in the ICUC® App. (See Fig. 4)

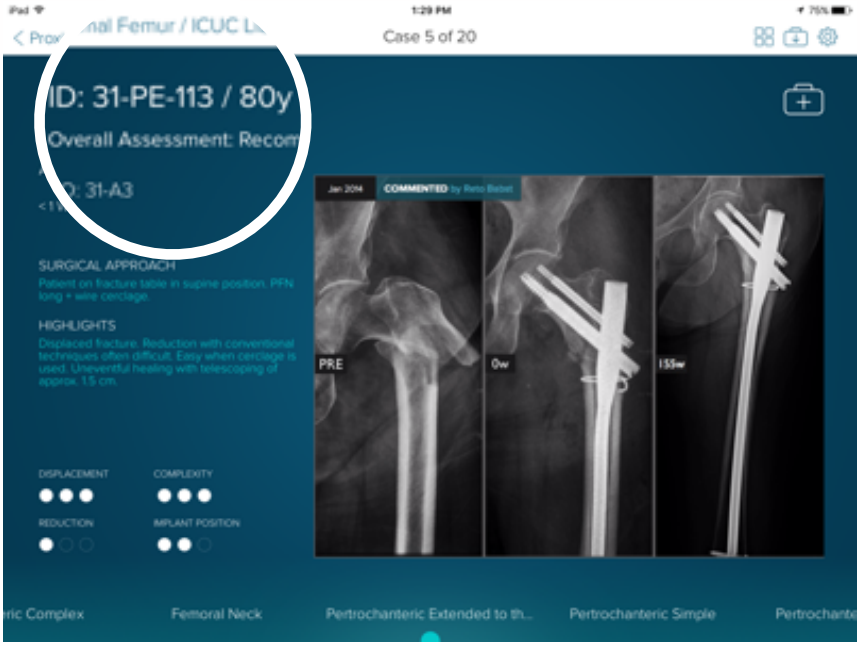


Fig. 4 Proximal Femur, pertrochanteric extended to shaft commented by Reto Babst. *A cerclage helps to reduce and holds the proximal lateral fragment in place. Details of the procedure are available in the app.* ICUC® App ID: 31 PE-113.

AO Surgical Reference (AOSR) and ICUC®

The examples above (Fig. 1-4) illustrate that AO Surgical Reference and ICUC app are complementary to each other.

In addition, it must be acknowledged that ICUC® is not just a simple collection of cases, but a new concept offering prospective, continuous and complete series of surgical cases. The individual surgeon can extract from both programs (AOSR and ICUC®), information according to his specific needs, whenever and wherever he wishes.

The creators of the ICUC® App have no desire to replace existing teaching tools or conventional “how-to-do-teaching". Rather, it aims to give the surgeon the opportunity to access a large number of continuous, unselected cases, and understand that difficulties and suboptimal or poor results, are part of daily practice. Difficulties and shortcomings are valuable sources of learning, if worked through properly. This is confirmed by previous experiences in the aviation industry: Working through, means to analyze and understand the situation leading to the shortcoming, in order to avoid repetition of the mistake and eventually change the process. This is much more effective than apportioning blame. In addition, full anonymization of the data protects both the surgeon and the patient, and is a prerequisite for impartial, valuable comments by recognized, non-involved experts.

In the ICUC® App, cases are documented from preoperative to functional result. This forms the basis for a continuous, complete and unchanged record of all surgical procedures. The completeness of the documentation is guaranteed by independent documentalists and certified by an external auditor.

After downloading the free app, the surgeon finds himself in a virtual operating theater and can observe the surgeries from close-up. With the iPad the user can visit different surgical centers. The observed cases are not meant to show what has to be done, but simply how anonymous surgeons treated the cases. The user can agree or disagree. Similarly, the experts can agree or disagree.

The section ‘ICUC library’ contains a series of prospective, continuous series of cases from different centers. Based on single cases or case series of the ICUC® App, clinical questions can be formulated. If the number of cases is significant, scientific information may be extracted.

A team of internationally renowned experts (www.icuc.net) guarantee the scientific quality, while a group of IT specialists, develop the videos, upload the expert comments and are responsible for the video clips and 3D imaging.

The ICUC® App is free of charge for individual users.

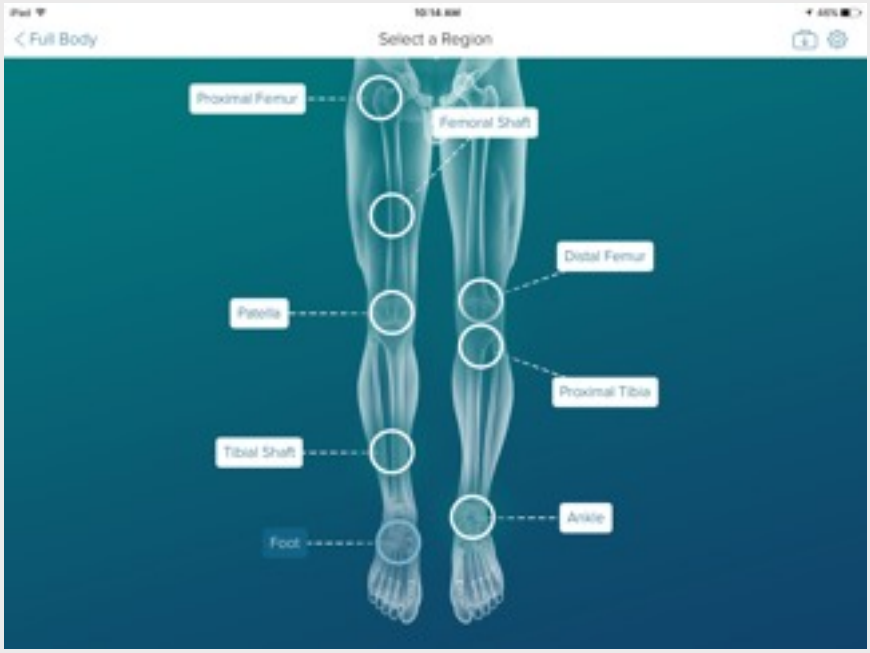
On line use is possible with an iPad as well as off line use, after downloading content from the ICUC® App.

Step-by-step Guide to finding a case within the ICUC® App:

Step 1. Click on the app store icon.

Step 2. Look for "ICUC" in the search bar. *Select and download ICUC® App.*

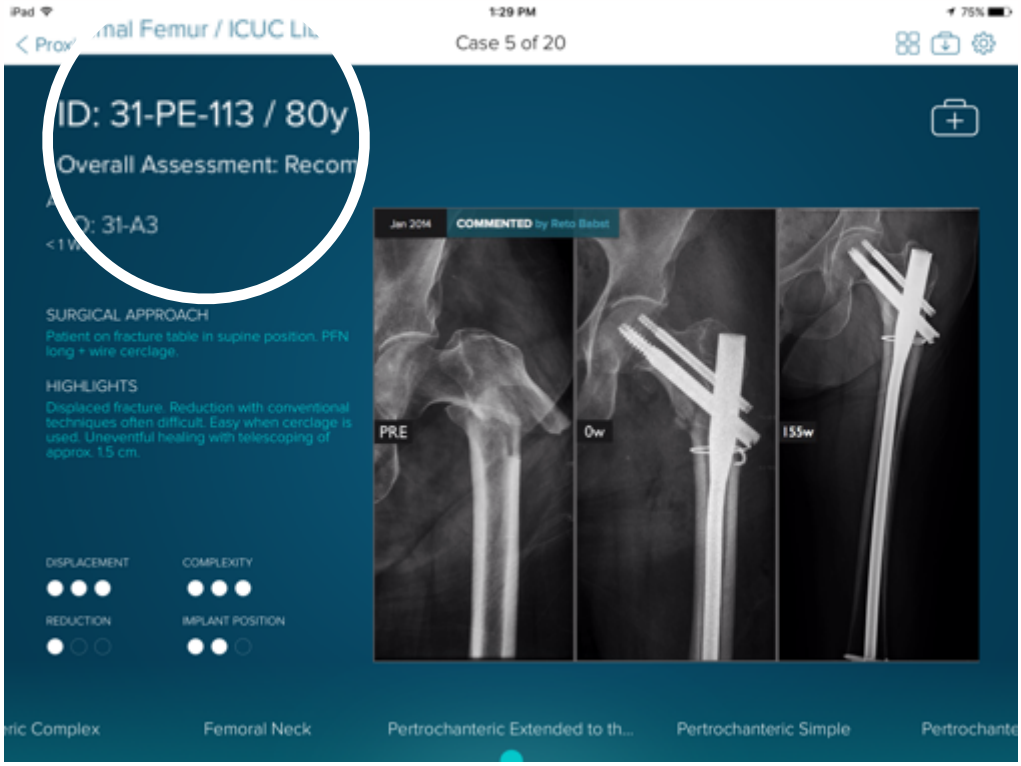
Step 3. *The upper and lower limb screen will be visible.*



Step 4. Navigate through the region *you want to explore. In this case we choose* ***Proximal Femur*** *within the* ***lower limb.***

Step 5. From the three chapters: "ICUC Library" *(complete series)****, "Reference Cases"*** *(strong surgical examples)* ***and "Expert Opinions"*** *(expert suggestions)****.***
We choose **ICUC Library.**

Step 6. *Scrolling through the library there are* ***four sub-chapters: "Femoral Neck", "Pertrochanteric Simple", "Pertrochanteric Complex"*** *and* ***"Pertrochanteric Extended to the Shaft".*** *Out of these four chapters.*
We choose the "Pertrochanteric Extended to the Shaft".



Step 7. The X-ray Overview, the data and assessments of the case appear.
It is a Proximal Femur, pertrochanteric extended to shaft commented by Reto Babst.
A cerclage helps to reduce and holds the proximal lateral fragment in place. Details of the procedure are available in the app.

Step 8. Download the case by tapping on the Briefcase icon. *It will be automatically downloaded to your Briefcase for later use on or off-line.*

Step 9. Explore the case *either by following the* ***chapters****, or selecting the chapter of your choice.*