

Short introduction ¹ - The potential of the ICUC[®] documentation concept

Part I: Extracting biological information of surgical fracture treatment

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The Problem

The standard documentation – radiological images and possibly single additional intra-operative images of the surgical field - lacks information on technical performance (3), tissue handling and problems (4) encountered and solved. The elements quoted have an important impact on biology and the latter is of vital importance mainly concerning fracture repair and infection resistance. To enable retrospective analysis with its potential of knowledge extraction improved surgical documentation is realized by the ICUC[®] app ².

The potential the ICUC[®]-documentation-concept to assess tissue handling

The ICUC Study Group has developed an orthopedic trauma app (2). The app is a product of the application of the ICUC concept in the field of learning. The goal is to add information about surgical aspects like tissue handling skills. These are usually undisclosed but have relevant biological effects. Two approaches to complete capturing and assessing the surgical interventions - including all critical steps - were considered: recording video clips or still pictures. Video clips provide dynamic continuous insight but their handling is more time consuming than screening professionally selected and recorded still pictures. The touchy point of the latter consists in the selection of each critical step. As a rule, surgeon-documentalists, competent in the performed surgery, define and record the critical steps. Thus, the two procedures offer advantages and shortcomings and their selection requires considering the information to be gained.

The ICUC[®] orthopedic Trauma App

The ICUC trauma app is an electronic learning tool based on data documented according to the above described concept. It includes details and a data volume that conventional learning tools cannot match. The app is expected to allow efficient learning according to individual needs and rhythm. Relevant process improvements are possible by secondary analysis of such improved, complete documentation.

Application of the ICUC[®] orthopedic trauma app

The ICUC app offers a wealth of surgical information. The resident uses this tool to prepare a surgical intervention browsing through similar cases with high quality recordings of all essential steps of the approach, reduction and stabilization. The advanced surgeon is enabled to follow close up the procedure of an expert surgeon closer than usually possible and at individually selectable speed including replay. Thus, while visiting centers more specific information may be obtained based on preconditioning. The surgeon in charge of education may discuss with his crew cases that are outstandingly documented. For the expert, the ICUC app is a tool for exchanging information, learning unusual procedures and honing its own technique. The pictures included in the ICUC app are freely accessible and can be used for different teaching purposes. ICUC does not charge but expects that the source be quoted.

¹ For more details and references see Acta chirurgiae orthopaedicae et traumatologiae Cecoslovaca 2017 (in press).

² www.icuc.net

DISCUSSION

The aim of the ICUC endeavor is to provide data that improves critical information which lacks in today's legally required documentation (1). Documenting surgical procedures provide biological information allowing knowledge extraction for surgical progress. The documentation, according to the ICUC-concept aims at transparency.

Once organizational prerequisites are fulfilled by the documenting hospitals independent medical "documentalists" collect still images and/or videos during predetermined continuous time periods. An independent auditor guaranties the implementation of the ICUC documentation rules for completeness and follow up. Anonymity protects the patient and the surgeon. The material, offered by the ICUC app, while allowing knowledge extraction finally improves the electronic access to a wealth of information within scientific publications.

The following figures illustrate the surgeon's tissue handling and insufficiencies of conventional surgical documentation. The statement is: minimal bone exposure with e.g. helical plate which keeps bone biology intact and is applied with only one additional small incision.



Fig. 1: Minimally invasive plating of a tibia fracture. This almost un-displaced fracture could also have been treated conservatively. The complete documentation (details can be found in the ICUC App, case ID: 42-WE-608) shows that the invasiveness of the plating procedure has really been minimal. The case of Fig. 1, a 20y old patient, illustrates that only minimal additional soft tissue damage was produced for the plating of the fracture. In contrast, the use of the descriptive term “MIO plating” in a written report would not guarantee that really “gentle soft tissue handling” was used.



Fig. 2: Tibia plating with more invasive tissue handling compared to case of Fig. 1. In contrast to the case of Fig. 1, more manipulation was needed in this case of tibia fracture (details can be found in the ICUC App, case ID: 42-SI-563). X-rays alone do not document this fundamental aspect. More manipulation, as used in the tibia fracture case of Fig. 2 can be described in a written report but one never gets a clear idea without images.



Fig. 3: Plate fatigue after plating of a complex ulna fracture. The evolution can be better understood, if we have an intra-operative documentation (right image) showing a completely denuded third fragment (details can be found in the ICUC App, case ID: 22-OB-272). Analyzing and understanding complex or even complicated post-operative courses ultimately allow processes and procedures to be improved.



Fig. 4: Minimal invasive plating of a tibia. The plate is slid onto the bone (left image) from proximal to distal. Fixation of the plate through the two small incisions (right image). Details can be found in the ICUC app, case ID: 42-WE-608.

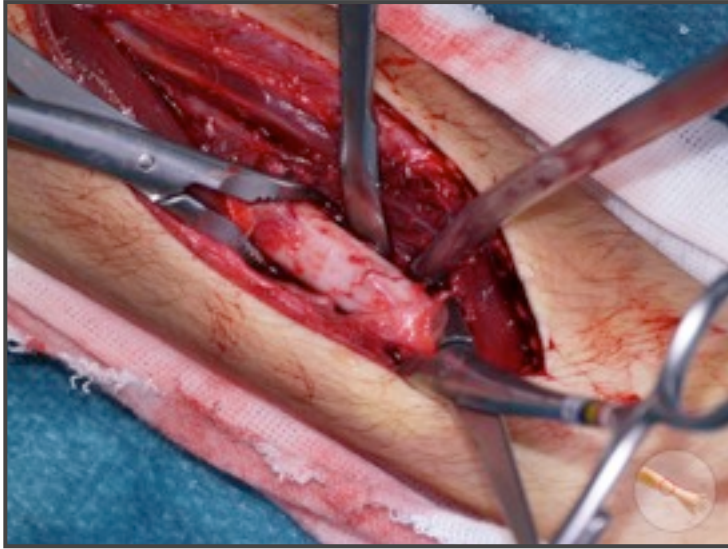


Fig. 5: Extensive bone stripping (internal fixation on a forearm). Details can be found in the ICUC app, case ID: 22-OB-019.



Medial approach for insertion of additional helical buttress plate



Fig. 6: Double plating of the femur: The second, medial (helical) plate is introduced without touching the fracture site with minimally invasive technique (Fig.7). Details can be found in the ICUC app, case ID : 33-EA-272.



Helical plate rotates as it is inserted



Helical plate is fixed to proximal femur with locking screws. Proximal end of both plates lie close to each other laterally.

Fig. 7: Introduction of the medial (helical) plate of the case presented in Fig. 6: The second, medial (helical) plate is introduced without touching the fracture site with minimally invasive technique (Fig.7). Details can be found in the ICUC app, case ID : 33-EA-272.

LITERATURE CITED

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