EFOR FOUNDATION

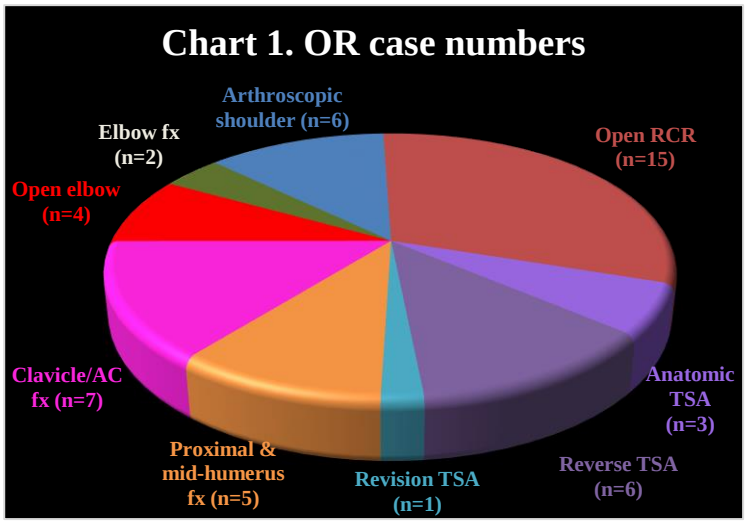
January 8th, 2021

First and foremost, I wish to express my sincerest gratitude for the inimitable opportunity that was granted to me through the EFORT Foundation to complete my international visiting shoulder and elbow fellowship with Prof. Dr. med. Ralph Hertel. The organization and financial assistance of these fellowships produced a clinical experience that was memorable, educational, and enjoyable.

Image 1. *First day at Lindenhofspital*

I would be remiss to not address the current coronavirus situation in Switzerland and its impact on the visiting fellowship. I was blessed to be able to travel internationally at a time when travel became challenging. I was able to enter Switzerland for work despite the current entry restrictions as a "case of special necessity" with the assistance of a letter from Prof. Dr. med. Hertel outlining my unique circumstances. When I arrived in late October for the mandatory 10-day quarantine prior to starting my rotation, Switzerland had low COVID case volumes. During that week and throughout the course of my rotation, the case numbers swelled resulting in restrictions at the hospitals. Due to these restrictions, learners were barred from attending clinic appointments but remained able to assist with operative cases throughout the rotation at the hospital administration's discretion. When not operating, missed clinical time was replaced with medical discussion, research, and scientific activities.

Over the course of my 7-week fellowship, I assisted Prof. Dr. med. Hertel in 49 operations covering multiple shoulder and elbow pathologies. We averaged 7 cases per week, though this case number is lower than typical for Prof. Dr. med. Hertel's busy practice due to the further hospital restrictions to maintain bed availability. We operated at two hospitals located in Bern that are part of the Lindenhofgruppe: the majority of cases were completed at the 284-bed, 12-OR Lindenhofspital (see Image 1) and a few cases were performed at the 73-bed, 4-OR Engeriedspital. The most common procedures with which I assisted were open rotator cuff repair (RCR) and total shoulder arthroplasty (TSA), which together comprised over half of the cases (see Chart 1). Other cases included shoulder and elbow fracture osteosyntheses, shoulder arthroscopy, and open soft tissue elbow procedures.



Prof. Dr. med. Hertel has created an extensive video library documenting numerous operative cases. As part of my scientific activities, we created and documented two high-definition

instructional videos of his technique for open rotator cuff repair of a subscapularis "hidden" lesion and, separately, a large, retracted rotator cuff tear. These videos were edited, narrated, and revised by me after several discussions of the anatomic dissection, techniques involved in the case, soft-tissue releases involved to adequately repair the cuff tissue, and his bone-tunnel repair technique. These videos (see Image 2) are available on VuMedi.com, an open platform for sharing medical information through video media and can be viewed here. Together, these videos have already received over nine hundred combined views and have stimulated online discussion after only two weeks of online availability. In order to teach others, I became very familiar with Prof. Dr. med. Hertel's technique and the VuMedi platform has enabled us to share this knowledge with a broader audience.

Image 2. *Thumbnail of the open RCR technique video from VuMedi.com*

In addition to these technique videos and in partnership with my visiting co-fellow, Dr. Armando Oseguera, we performed a literature review to determine the feasibility of re-defining the glenohumeral and scapulohumeral axes to improve and standardize pre- and intra-operative surgical planning for shoulder arthroplasty. We held several academic discussions regarding this topic and are awaiting assistance from Medacta International to utilize their three-dimensional planning software with plans for further research. We plan to analyze normal and pathologic shoulders to more adequately define these axes and this study will continue to advance outside the fellowship.

There were multiple first experiences in regards to technical skills that I learned. Prior to my rotation with Prof. Dr. med. Hertel, I had not assisted in an open rotator cuff repair nor witnessed intramedullary fixation of a clavicle fracture. As open RCR was the most common procedure performed during my fellowship (and the content of my educational videos), I gained a thorough understanding of Prof. Dr. med. Hertel's correlation of advanced imaging findings to intraoperative arthroscopic pathology, indications for surgical intervention, superior and deltopectoral approaches to the shoulder, soft tissue releases of the rotator cuff tendons, anatomic repair and osseous tunnel fixation, and postoperative rehabilitation protocols. In addition, some of this knowledge overlapped with his approaches to shoulder arthroplasty. Prof. Dr. med. Hertel emphasized his technique for posterior capsular release combined with posterior humeral dislocation for glenoid access during total and reverse shoulder arthroplasty. Along a similar suture, he explained the rationale for complete and thorough capsular release for improved surgical exposure, easy component alignment, and balanced force-coupling of the cuff tendons during arthroplasty. Finally, Prof. Dr. med. Hertel utilized custom laminar spreaders (among other custom instruments) placed in a mechanically efficient way for final reduction of the arthroplasty

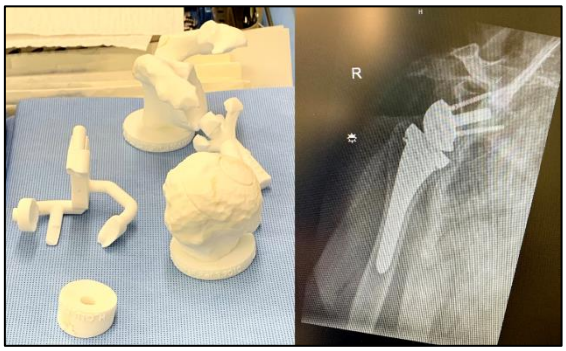


Image 3. *PSI used for a reverse shoulder arthroplasty and the corresponding postoperative radiograph*

components. This technique was reproducible and a valuable solution for a frequently difficult problem.

In complementation to the above, we also held pre-, intra-, and post-operative discussions about the creation, implementation, and practicality of patient-specific instrumentation (PSI) and planning for total and reverse shoulder arthroplasty (see Image 3). This discussion included the preoperative three-dimensional planning process and how to evaluate the precision and accuracy of the PSI intraoperatively. We found that minor adjustments were often made to the glenoid preparation to fine-tune the placement of the PSI or corrections created for accurate alignment of the glenoid components. It was a good reminder that even sophisticated PSI is still just a tool in the hands of a competent surgeon.

Image 4. *Socially-distanced discussions with Prof. Dr. med. Hertel over coffee after an operative day*

Aside from clinical knowledge, we also held discussions regarding the historical background for procedures and anatomic discoveries. We discussed the development of the Trillat, Putti-Platt, Latarjet, and Bristow procedures for anterior shoulder instability and how there still remains geographic variability for the performance of these procedures. Similarly, we reviewed the original article by Bankart describing his eponymous lesion to gain insight on the first description of this lesion and noted that current publication requirements are much different than they were in orthopedic surgery's infancy. We held discussions on business and hospital management regarding second opinion practices and the advantages and disadvantages of ambulatory surgical centers. Needless to say, our post-operative day discussions were informative, stimulating, and multifaceted.

Beyond the clinical and surgical aspects, there were various social aspects of the fellowship worth commentary. I was pleased to share my rotation with my co-fellow Dr. Armando Oseguera from Mexico and this sparked a new international friendship. Intraoperatively, along with surgical discussions, we conversed over the German translations for various instruments and terms. One of my favorite colloquialisms included the term "eselsohren" which directly translated is "donkey ears" and the Swiss German equivalent of "dog ears" in English when used to describe excess, bunched soft tissue during a suture repair. After most of our operative days, we would end the day with socially-distanced coffee and discussion (see Image 4). Our topics ranged from the current coronavirus restrictions to the muscular pennation angle and its interplay with fatty infiltration in chronic rotator cuff tears to radial mismatch in shoulder arthroplasty components.

Image 5. *Santa scrub hats, (left to right) Prof. Dr. med. Hertel, Nina (scrub tech), Dr. Oseguera, and me*

Throughout the course of the day (and occasionally during a single procedure), it was not uncommon to hear fluid changes in conversation between Swiss German, English, French, Spanish, and Italian languages. One of my favorite memories was on my last operative day in December when Prof. Dr. med. Hertel,

Armando, our scrub tech Nina, and I all wore "medical-grade" Santa hats in the OR suite (see Image 5). I had never seen these types of scrub hats before but it was an annual tradition at the Lindenhofspital. There was a genuine international collegiality present throughout the rotation that was evident in the social interactions that occurred. My wife and I also had the luxury to explore multiple Swiss municipalities and augment our travel with experiences such as hiking in Appenzell, Alpine käsefondue, skiing at Zermatt, skijöring at St. Moritz, and sleeping overnight in a mountain igloo in Davos.

Although in my future practice it will likely be rare that I perform an open RCR, there was great utility in observing a master surgeon performing in his element while describing perfectly the pertinent anatomy, critical steps, and pitfalls to avoid. There are certain elements of his technique that are applicable to multiple surgeries and I found that the open procedures regularly facilitated a higher understanding and mental visualization of the goals of the arthroscopic-equivalent procedure. I hope to implement several of his techniques in the future, including utilization of a lesser tuberosity osteotomy during shoulder arthroplasty for osseous healing of the subscapularis tendon insertion. I will consider his technique for posterior humeral dislocation for glenoid exposure during shoulder arthroplasty with the understanding that this method requires a learning curve and custom instrumentation to achieve a level of mastery. I was also reminded of a return to the basics for antimicrobial prophylaxis and avoiding failure of bony fixation which should be present in every practice. For example, Prof. Dr. med. Hertel takes great personal care in the preoperative positioning, sterile preparation, and draping of each patient and greatly limits the use of gloved fingers in the surgical wound in favor of the use of sterilized instrumentation in order to decrease the risk of surgical infection. He also emphasizes copious use of sterile irrigation to cool saws, drills, and taps to limit heat necrosis in the bone. Finally, he prefers to tap screw trajectories by hand, especially when the screw will be heavily relied upon for definitive bicortical fixation. The above demonstrations by Prof. Dr. med. Hertel will translate directly into my own hands.

Image 6. *Intraoperative discussion between (left to right) Prof. Dr. med. Hertel, Dr. Oseguera, and me*

As I reflect upon my two-month fellowship, I am appreciative that this opportunity filled a gap in my orthopedic residency education as Baylor lacks a dedicated shoulder and elbow subspecialty rotation. I expanded my surgical knowledge beyond arthroscopic means with an improved understanding of the anatomy and approaches to the upper extremity joints. I became more comfortable with the delicacy of the deltopectoral approach and soft tissue handling for total shoulder arthroplasty. I improved my understanding of pre- and intra-operative planning for accurate component alignment for total and reverse arthroplasties. I was able to share knowledge with a virtual audience through two instructive videos. And, most importantly, I re-confirmed my desire to complete a second fellowship in the shoulder and elbow subspecialty due to the enthusiasm and passion with which Prof. Dr. med. Hertel inspires and teaches.

My future plans include the completion of my orthopedic residency at Baylor College of Medicine in June 2021 which is closely followed by the American Board of Orthopedic Surgery Part I exam for board certification in July. In August, I will start a one-year sports medicine fellowship at the Steadman Hawkins Clinic of Denver, now affiliated with the University of

Colorado Health Programs. I am concurrently preparing for interviews for a second one-year fellowship in shoulder and elbow surgery that would follow in August 2022. After completion of fellowship, I aspire to join a practice that allows me to augment my partners' surgical expertise, provides opportunities to educate the next generation, and fosters community and patient engagement, whether local or global.

Finally, I wish to conclude with a recognition that my international fellowship experience would not have been possible without the organization and financial support from the EFORT Foundation for which I am intensely grateful. My most sincere thanks also goes to Prof. Dr. med. Ralph Hertel and his hospitality in hosting both me and Dr. Oseguera during an unprecedented time in recent medical history. The memories I gained during my two months in Switzerland will not be forgotten and the knowledge I acquired will continue to be applied in my clinical studies and future practice.

Herzlichen Dank,

Brian Davis, MD

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Image 7. *(left to right) Dr. Armando Oseguera, Prof. Dr. med. Hertel, and me at Lindenhofspital*