Caritas-Krankenhaus
Bad Mergentheim

# How long should my video documents be to allow others reproduce what I diagnosed during wrist arthroscopy?

Steffen Löw, Holger Erne, Alexander Schütz, Frank Unglaub, Christian Spies

**Objectives:** Arthroscopy has become a cornerstone of diagnosis and treatment of various wrist disorders. Concurrently, adequate documentation of arthroscopic findings is necessary. However, photos as well as videos have to meet specific quality criteria to allow reproducibility of diagnoses based on these documents[1-3]. As for videos, an adequate length of the sequences was claimed. Therefore, the purpose of this study was to examine the relationship between video length for wrist arthroscopy and interobserver reliability.

## Materials and Methods:

100 consecutive wrist-arthroscopies were documented by videos of the radiocarpal and the midcarpal joint, each by a **long** and **short** video

**Radiocarpal** - **long**
**Midcarpal** - **long**

**Radiocarpal** - **short**
**Midcarpal** - **short**

= 200 pairs of videos

**long** videos about twice as long as **short** videos

**Randomization of the 200 pairs of videos**

**long - long**
**long - long**
**short- short**
**long - long**
**short- short**
**short- short**
**short- short**
**long - long**
**long - long**
**short- short**
**long - long**
**short- short**
**…**

**The videos were re-assessed by 2 experienced wrist surgeons without the knowledge of…**
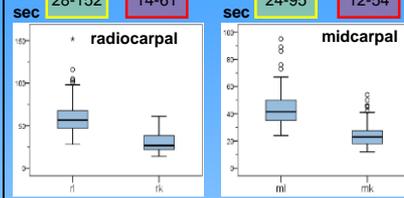
- the intra-op diagnosis
- the studies hypothesis

**The diagnoses based on these re-assessments were compared with the intra-operative diagnoses**

**Kappa-coefficients were calculated**

**Results:**

**Video lengths:** long videos significantly longer than short videos (each p < 0,001)

Ø 59.4 ±19.9 28-152 sec
Ø 30.0 ±10.6 14-61
Ø 43.6 ±13.8 24-95 sec
Ø 24.0 ±8.6 12-54


radiocarpal / midcarpal box plots

**Relevant ligament lesions** according to long videos more likely to be detected

| Kappa-Coefficients | Examiner 1 | | Examiner 2 | |
|---|---|---|---|---|
| Video-Length | short | long | short | long |
| Ligaments | | | | |
| SL ligament intact/part/total rupt. | 0.436 | 0.573 | 0.834 | 0.763 |
| SL ligament mod. to Geissler | 0.574 | 0.692 | 0.562 | 0.638 |
| LT ligament intact/part/total rupt. | -0.009 | 0.463 | -0.019 | 0.286 |
| radiopalm. lig. intact/part/total rupt. | -0.019 | 0.109 | 0.271 | 0.593 |
| TFCC | | | | |
| Trampoline effect | 0.342 | 0.317 | 0.229 | 0.457 |
| Palmer Class. | 0.260 | 0.297 | 0.249 | 0.226 |
| Synovitis | | | | |
| radiocarpal | 0.479 | 0.423 | 0.522 | 0.326 |
| ulnocarpal | 0.253 | 0.375 | 0.189 | 0.352 |
| midcarpal | 0.412 | 0.456 | 0.310 | 0.216 |

**No consistent advantage** of long over short videos **according to Kappa-values**

| Kappa-Coefficients Examiner 1/2 | Assessment according to Outerbridge | | Cartilage lesion present/ not present | |
|---|---|---|---|---|
| Video-Length | short | long | short | long |
| Wrist in total | | | | |
| | - | - | 0.465 / 0.639 | 0.524 / 0.700 |
| Radiocarpal | | | | |
| Scaphoid Fossa | 0.317 / 0.470 | 0.268 / 0.439 | 0.393 / 0.615 | 0.393 / 0.658 |
| Scaphoid | 0.217 / 0.427 | 0.386 / 0.368 | 0.249 / 0.584 | 0.596 / 0.470 |
| Lunate Fossa | 0.112 / 0.515 | 0.267 / 0.205 | 0.758 | 0.387 / 0.308 |
| Lunate | 0.357 / 0.531 | 0.412 / 0.600 | 0.397 / 0.574 | 0.481 / 0.653 |
| Midcarpal | | | | |
| Scaphoid | 0.010 / 0.033 | 0.000 / 0.099 | -0.015 / -0.048 | 0.000 / 0.221 |
| Lunate | 0.010 / 0.359 | 0.000 / 0.201 | -0.015 / 0.481 | 0.000 / 0.421 |
| Capitate | 0.349 / 0.270 | 0.433 / 0.467 | 0.530 / 0.393 | 0.682 / 0.576 |
| Hamate | 0.154 / 0.657 | 0.208 / 0.560 | 0.196 / 0.699 | 0.347 / 0.714 |
| Triquetrum | 0.012 / 0.279 | 0.010 / 0.483 | -0.016 / 0.267 | -0.016 / 0.580 |

**Twice as many false-positive cartilage lesions** according to short videos

| False-positive Cartilage lesion assessment | Examiner 1 | | Examiner 2 | |
|---|---|---|---|---|
| Video-Length | short | long | short | long |
| Wrist in total | | | | |
| | 4.1% 0.5-13.98 | 2.04% 0.05-10.85 | 22.45% 11.77-36.62 | 13.73% 4.63-24.77 |
| radiocarpal | | | | |
| Scaphoid Fossa | 3.5% | 3.5% | 4.7% | 1.2% |
| Scaphoid | 4.5% | 1.1% | 10.2% | 8% |
| Lunate Fossa | 0% | 0% | 3.7% | 3.7% |
| Lunate | 0% | 0% | 13.5% | 12.2% |
| midcarpal | | | | |
| Scaphoid Fossa | 1% | 0% | 10.3% | 4.1% |
| Lunate | 1% | 0% | 3.1% | 4.1% |
| Capitate | 4.7% | 1.2% | 20% | 9.4% |
| Hamate | 4.3% | 4.3% | 11.4% | 8.6% |
| Triquetrum | 1% | 1% | 7.3% | 3.1% |

Of the 10 complete SL lesions, **9** detected on long, **6** on short videos.

The single complete LT lesion by both examiners **only detected on the long** video.

Of the 15 partial LT lesions, **7/2** detected on long videos, compared to **1/0** by examiner 1/2.

**Literature:**
[1] Löw, Prommersberger, Pillukat, van Schoonhoven (2010) **Intra- and interobserver reliability of digitally photo documented findings in wrist arthroscopy.** Handchir Mikrochir Plast Chir. 42: 287-292
[2] Löw, Herold, Mühldorfer-Fodor Pillukat (2012) **The effect of labeling photo documents in wrist arthroscopies on intra- and interobserver reliability.** Arch Orthop Trauma Surg. 132:1813-1818
[3] Löw, Pillukat, Prommersberger, van Schoonhoven (2013) **The effect of additional video documentation to photo documentation in wrist arthroscopies on intra- and interobserver reliability.** Arch Orthop Trauma Surg.133: 433-438

**Conclusion:** The video length influenced reproducibility of diagnoses based on the video documents. Long videos reduced the risk of false-positive cartilage lesion assessment. And, detection of relevant ligament lesions was more likely viewing longer videos. Therefore, we recommend that a simple wrist should be documented by a 60sec. video sequence of the radiocarpal joint and a 45 sec. sequence of the midcarpal joint. Videos of difficult joints should last appropriately longer.

**Correspondence to:**

Steffen Löw MD
Caritas-Krankenhaus
97980 Bad Mergentheim
Germany

steffen_loew@hotmail.com