# Development of a Personalized Surgical Video Library for Assessing Technical Skills Performance with Computer Vision

SOAR Surgery Objective Analysis and Review

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## Background

There is a need to expand the surgical workforce to adequately address basic healthcare demands globally, including the United States.[1] Innovative educational technologies that accelerate trainees along the surgical learning curve are of major interest to address this gap. Here, we show how to use laparoscopic surgical videos effectively, both for preoperative study and for postoperative feedback to a trainee. Surgical video review is a known underutilized opportunity to improve technical skills and intraoperative decision making.[2]

## Methods

We are developing and prototyping[3] a surgical video library designed to efficiently provide information to trainees during brief periods in their day. Sample end-user needs are shown in Table 1, taken from interviews with international and U.S. surgical trainees. The interface provides rapid and flexible searches for videos meeting specified criteria, such as type of operation, tools used, patient characteristics, and AI or human generated ratings of surgical proficiency. After multiple iterations, we developed our current needs statement. (Table 2)

## Results:

Figure 1: Interactive home screen for profile specific procedure metrics and operative performance metrics.

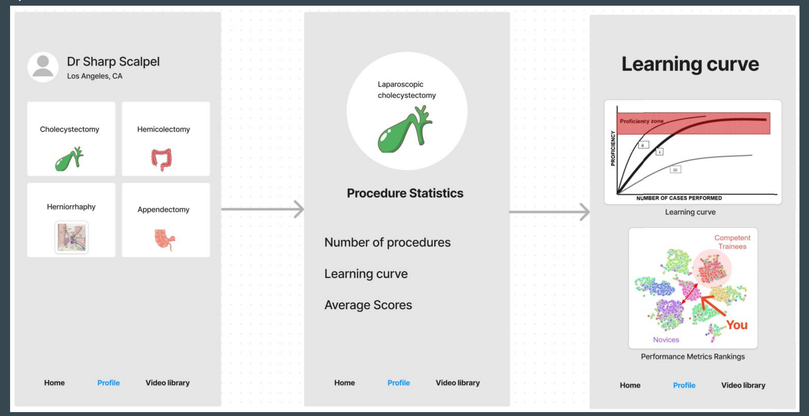



Table 1: End-user feedback and general themes

| | |
|---|---|
| **Attending Preferences** | "Tomorrow Dr. X is doing a lap chole, what will she expect me to know about her operative preferences?" |
| **Trainee Specific** | "I have trouble with retraction with my left hand instrument, show me good examples of left hand retraction during cystic triangle dissection." |
| **Attending Debrief** | "I noticed trainee having trouble with: retraction on gallbladder infundibulum during clipping, find that example." |
| **Rapid Review** | "I only have 5 minutes to review for a case." |
| **Presentation Prep** | "We need to organize video clips for a presentation the next day" |

Figure 2A: Sample query for attending approach on knot tying in the institutional level video library.

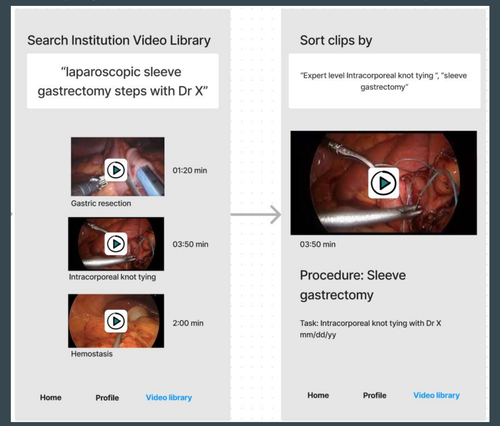



Figure 2B: Sample query of global video library of ligation & division step using a endo-GIA stapler.

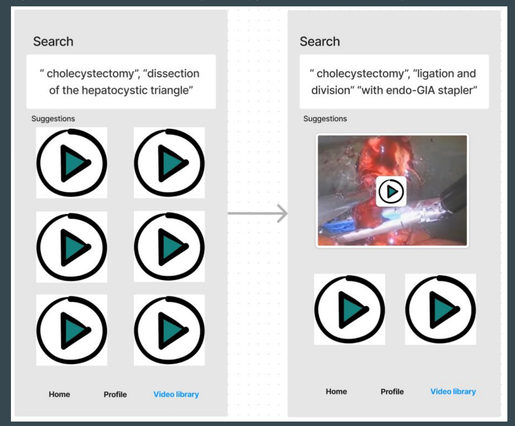



Table 2: Needs statement for video library design

| | |
|---|---|
| **Problem** | A way to efficiently access relevant video clips on demand while in the hospital |
| **Population** | for surgical trainees preparing for, or debriefing after, an operation |
| **Outcome** | in order to achieve a deeper understanding of lessons learned from an operation. |

## Conclusions

In the future, we plan to implement an institution adaptable computer vision model that can best be tailored to the specific needs of a given site's surgical trainees and surgeons preferences. We plan to test this in a prospective pilot study. We envision this tool can be used in conjunction with SIMPL assessments to track where surgical trainees are on the learning curve towards competency.

## References

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