

## **Time and Cost-Savings with an experienced OR team using FloShield™ to maintain a Clear Image During Complex Laparoscopic Surgery**

**Abstract:** Complex laparoscopic surgery requires a clear view of the operative site. During these procedures it is very common to remove the laparoscope from the patient multiple times for cleaning or to eliminate condensation. We describe the use of FloShield™, a device that prevents fogging and deposition of debris on the lens of the laparoscope, to produce time and cost savings in the OR.

### **Background**

The insertion of a cold laparoscope into the abdominal cavity results in condensation on the end of the scope obscuring vision. During surgery heat may conduct through the shaft of the steel laparoscope resulting in fogging even though a warm scope was originally introduced. Debris floating within the abdominal cavity, and especially mist or smoke generated by energy cutting or cautery devices, will result in deposition on the lens and a diminished view.

Current solutions require interruption of surgery. Hot water may be used to warm the lens to inhibit fogging and this requires that the scope be rapidly reintroduced before cooling. If the trocar seal needs cleaning, the cycle must be repeated. Anti-fog liquids have surface properties that may prevent condensation, but will not work effectively unless they are allowed to dry on the lens surface before the lens is introduced.

OR teams will often wipe a dirty lens against abdominal viscera and this may leave a film on the lens. A surgeon may work through the resultant “haze” to keep the operation proceeding. Alternatively, the lens may be removed, cleaned, re-warmed, and reinserted. An experienced OR team can make quick work of that transition, but camera holders that are less experienced may find the task time consuming. Finally, it is common for trocar seals to deposit debris on the end of the laparoscope during re-introduction, which OR staffs find particularly irritating.

### **Study Premise**

FloShield™ is a disposable device that prevents debris or fog from attaching to the end of the laparoscope by creating an invisible air-curtain effect at the terminus of the scope. This paper considers the ability of the device to save time in the operating room during complex laparoscopic surgery.

## **Study Design**

The study utilized a retrospective review of 66 cases of laparoscopic gastric bypass for the treatment of obesity performed by a single surgeon and an experienced OR team that had worked together for years. 33 cases were performed consecutively before the surgeon had ever used FloShield™, and then 33 cases after the use of FloShield™ had become routine. Time measurement was from first incision to wound closure and was taken from the OR nursing record. The only exclusion criteria was previous major abdominal surgery.

The team had worked together for years and had clearly established an instrument flow during surgery to minimize time lost, and especially around the need to remove the camera for cleaning. In fact, this surgeon had established a habit before the use of FloShield™ where the OR was maintained at an uncomfortable temperature just to inhibit fogging and keep the shaft of the scope warm.

It was felt that this OR team had already minimized loss of time from interrupting the surgery to clean the camera, and was therefore a good proxy for the least time that might be expected to be saved from not removing the lens. All surgeries were performed at Riverside Methodist Hospital in Columbus, OH by one bariatric surgeon.

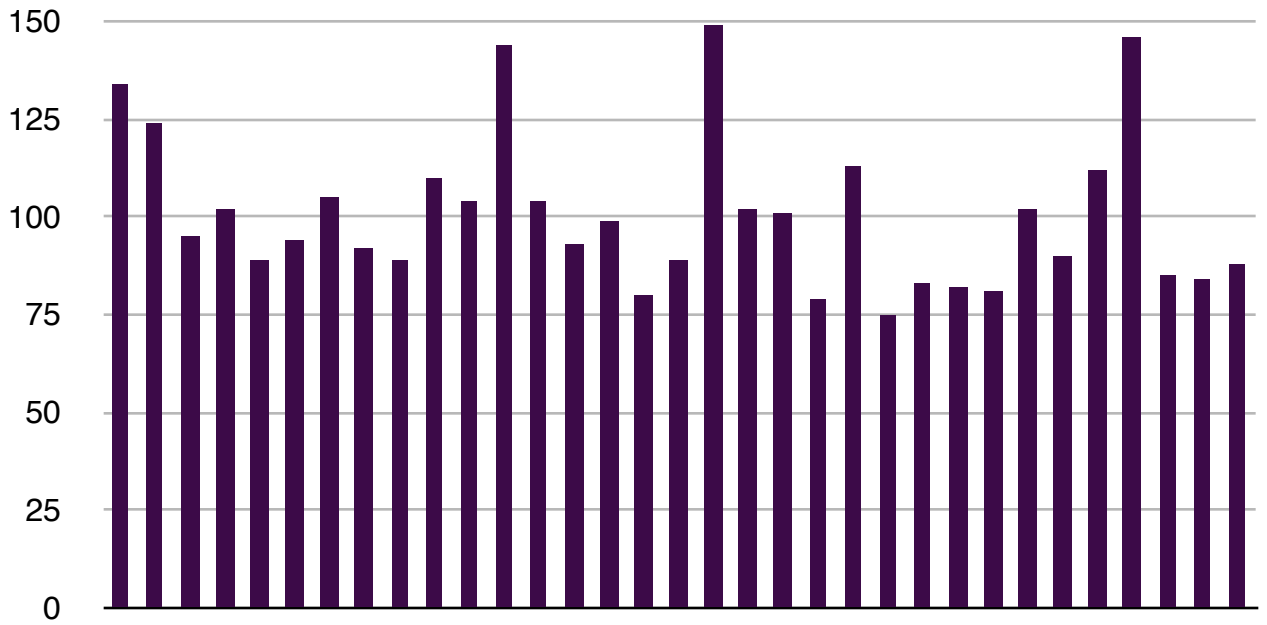
## **Results**

All cases were completed without intraoperative complication and without open conversion.

Without FloShield™ operative time averaged 101 minutes compared to 91 minutes with FloShield™.

It is also common for certain surgical cases to have more problems with debris on the laparoscope than others, and these cases require more frequent removal for cleaning of the lens. This seems to be particularly true for condensation as the deposition of fog on the lens can be affected by intra-abdominal humidity. In comparing the 1/3 longest cases from each category, the average time without FloShield™ was 114 minutes versus 94 minutes with FloShield™. Looked at differently, the number of surgeries that exceeded 100 minutes with FloShield™ was 6 and without FloShield™ 15.

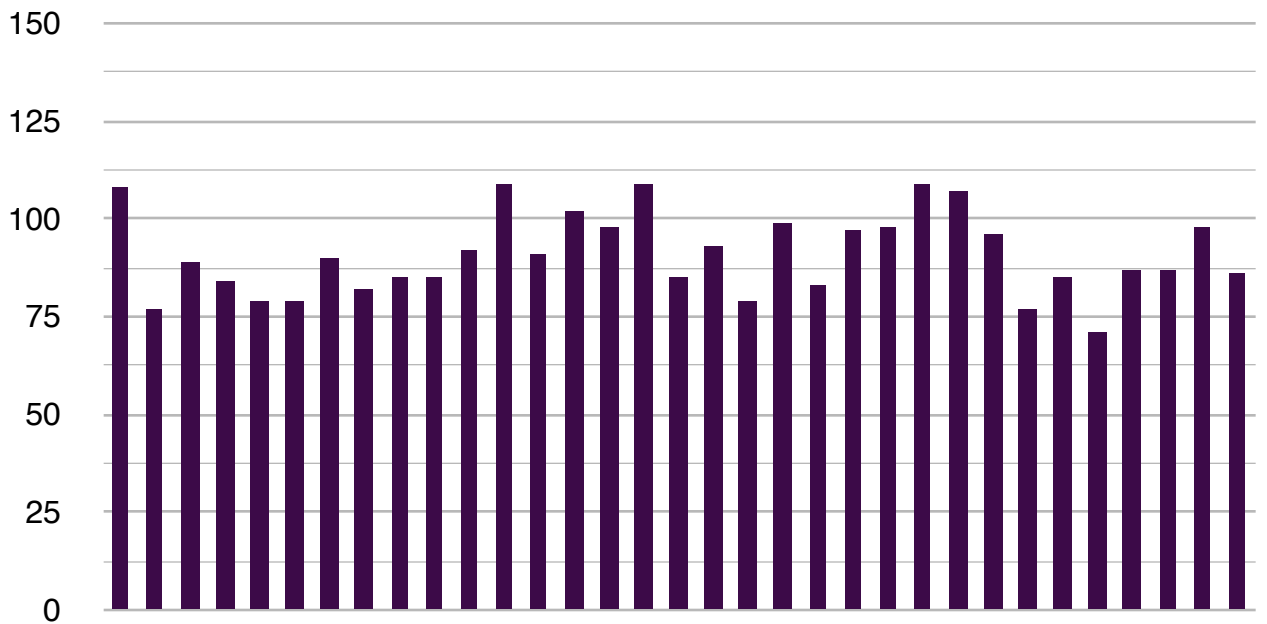
Minutes



### 33 surgeries without FloShield™

15 Cases over 100 minutes

Minutes



### 33 surgeries with FloShield™

6 Cases over 100 minutes

## **Cost Analysis**

Operating Room time costs hospitals from \$1000-2000 per hour, and a commonly repeated figure is \$1400/hr, or \$23/min. The use of FloShield™ even among an experienced surgical team in this study saved approximately \$230-460 per surgery.

OR savings are cumulative, in that no single efficiency tactic will likely result in less support staff or reduction in open operating rooms. However, taken together with savings produced by improving pre-op throughput, more rapid room turnover, and other techniques, the use of FloShield™ may produce cumulative cost savings by shortening cases, especially as the number of laparoscopic cases increases and then also with less experienced camera holders.

## **Clinical Analysis**

It is important for surgeons to have a clear and uninterrupted view of the operative site during laparoscopic surgery. The fact that surgeons will frequently wipe the lens surface on viscera and then operate through a diminished view indicates that surgeons wish to keep the lens in the patient so that the flow of the dissection may continue without pause.

In this particular example, the surgeon using FloShield has now been able to turn down the temperature in his OR to a more comfortable level for the OR staff.

## **Summary**

It is important that the operating team maintain a clear image during laparoscopic surgery and that their efforts not be distracted by the frequent need to remove the lens for cleaning or defogging. This initial retrospective analysis raises the possibility that FloShield™ resulted in a time savings, even among an experienced and integrated OR team. This time savings could prove significant for Surgery Department operations if FloShield™ were utilized in a majority of procedures, as the time savings could be cumulative.

The results of this study refer to one highly experienced operative team who had, over time, coordinated their efforts to the greatest extent possible to minimize the necessity for lens cleaning and defogging. It is expected that experienced OR teams that do not always work together, and as a result do not routinely have their movements coordinated, might save more time, and in some cases, considerably so.