Operating room organisation, set-up and ergonomics in laparoscopic surgery
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“A professional, well-choreographed execution of a complex endoscopic procedure displayed on the monitor for all to see inspires confidence within the team and provides extreme professional satisfaction, in addition to ensuring an excellent clinical outcome.”
A. Cushieri-S. Szabo
Successful operative laparoscopy requires 3 essential ingredients:

- Surgical skills
- A surgical team
- A well designed & equipped OR

Surgical skills

- Precision
- Rapidity
- Efforts economy
- Adaptability

Instrumented hand in laparoscopy

Parietal fixed point,
Only basic movements are easy and feasible,
Narrow space
Limited solutions (haemostasis),
Importance of complications,
Technological environment,
The instruments should be adapted to the constraints and needs.
Degree of freedom

Surgeons' perceptions and injuries during and after urologic laparoscopic surgery.
Gofrit ON, Mikahail AA, Zagaja GP, Steinberg GD, Shalhav AL.
Department of Surgery, Section of Urology, University of Chicago, Chicago, Illinois 60637, USA. ong1000@netvision.net.il

RESULTS:
Neuromuscular or arthritic symptoms during surgery were reported by 22 responders (30%), the most common was finger paresthesia (18%). 45% of the surgeons suffered from hand and wrist numbness and 37% reported pain in these areas.

CONCLUSIONS:
The laparoscopic operating theater is a hostile ergonomic environment. Future improvements in instrument design according to ergonomic principles are highly warranted.

Ergonomy : definition

ergonomy:
greek:
- ergon : work
- nomos : law
1) Quantitative and qualitative study of your work in order to improve the conditions of work and increase the productivity.
2) Look for a better adaptation between the function, the equipment
Pivotal moment

Le moment de forces

If A=B precision & force

If A>B too much force

If B>A no precision

Trocars placement leads to the success of the procedure!
Trocars placement

- The surgeon’s right hand should not be lower than the left, so the central trocar should never be lower than the lateral.
- Intra-abdominal length of the instruments should be equal at the external.

Precision and force perception

Advice

Keep the right position for the surgeon:
Two elbows along the body.

Trocars placement is the most important part of the surgery

Anatomy info

Instruments info

Energy info

Remove (hide) the no needed info.

Put all informations needed on your screen!

Laparoscopy and Visual-perception

Natural line of sight

Misorientation+++

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A trocar used for retraction is lost for surgery. Every time possible retraction should use an alternative way.

Retraction restriction

Hemostasis

The time between the start of the bleeding and the possibility for a safe laparoscopic reparation is short. To introduce in place all the instruments needed could be long....

So ... We have to be preventive, And... Some technology can be useful, But ... If bleeding, respect some rules

Never wash!

Lavage just bring inconvenients!

Loss of exposure:
- space, light, pressure

Loss of anatomical plane:
- œdema

Loss of energy efficacy

Loss of time

If you do not want to wash:
- target = result = think twice!
Operating Room

Problems in OR environment

- Large number of medical devices
- Devices not positioned within reach and view
- Difficulties in operating the lines connecting patient and device
- Different user interface
- Lack of communication between process members
- Poor organisation and standardisation within the process
- Lack of automation between process steps

KARL STORZ OR 1™ The Integrated OR of the future

- Lighting Control
- Flat Screen technology
- OR Table Control
- Touch Screen Control
- OR-Devices
- Ceiling Panel System
- Centralized Control
Operative table

- Freedom of operative spaces
- Height:
  - No skin incision
  - Pneumoperitoneum
  - Trendelenbourg
  - Instruments' length
- The operative field is about 30 to 50 cms higher

Patient positioning

- Abducted legs
- 3 working spaces
- Protection of the patients body
Team organisation

Basic knowledge of equipment and instruments functioning is mandatory!
At least 1 equipment failure was noted in 38.8% of operative procedures, 41.9% of laparoscopies, and 37.3% of hysteroscopies. Fluid, gas, and light transmission was faulty in 36.2%, surgical instruments in 29.3%, the electric circuit in 22.4%, imaging in 12.1%.

Of malfunctions, 46.6% were a result of faulty connection between 2 elements.

The most common cause for concern was bipolar forceps and cables in laparoscopy (42.3%) and the assembly of small parts in hysteroscopy (47.4%). Personnel were implicated in 43% of cases (nurses in 72%, surgeons in 12%, both in 16%).

1 equipment failure increased the total duration of laparoscopy by 7% and of hysteroscopy by 20%. The mean delay was 5.6±4.0 minutes by equipment failure. Of the incidences, 19% could have led to serious complications for the patient.

CONCLUSION: Equipment malfunction is common in endoscopic surgery and concerns both laparoscopy and hysteroscopy. Consequences are potentially serious.
Video equipment = chain

Light source
Light source

White balance
- It is not necessary to have a large range of instruments to perform laparoscopy.
- It is, however, necessary to have the correct instruments.

**Instruments**

**Multifunctional instruments**

**Bi-polar forceps**

Clermont-Ferrand’s model
Principaux instruments utilisés en cœlioscopie.

- a, pince grip
- b, pince à extraction
- c, pince fenêtrée digestive
- d, dissecteur
- e, pince plate fine
- f, pince à biopsie

**MANHES Grasping forceps**

**Laparoscopic Needle Holder “CO-AXIAL” Szabo-Bardi**

**Needle holders**
Instruments

Needle holders

Surgery:
75% of reflexion
25% manual skills!
CONCLUSIONS

- Laparoscopic specificities imply surgical quality as: precision, minimal trauma, minimal blood loss etc...
- But.... these advantages show up only if the technique is well performed
- A well performed surgery can only be carried out if an adaptation between the function, the equipment and the