



Original research

Laparoscopic insertion of the peritoneal catheter in ventriculoperitoneal shunting. Review of 405 consecutive cases

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HIGHLIGHTS

- The laparoscopic procedure allows exact localization of the peritoneal catheter and its proper functioning.
- The Surgical time can be shorter even to 30 min decreasing the anesthesia needed and its possible side effects.
- The laparoscopic procedure may decrease the incidence of peritoneal catheter misplacement even to 0%.
- The position of the peritoneal catheter must not be controlled using X-ray which help to avoid extra radiation exposure.
- A diagnostic or a therapeutic laparoscopy can be done during the same surgical session.

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ABSTRACT

Background: Based upon our excellent previous experience with 151 adult patients and 39 children whom had the peritoneal catheter in ventriculoperitoneal shunting placed laparoscopically, we continued following this technique as a first-line-procedure in ventriculoperitoneal shunting. Now we analyzed our experience with additional 405 cases for a better comprehension of the complications, advantages and disadvantages of this procedure on this high number of patients. A strict interdisciplinary setting with the maximum of medical intraoperative competence was our goal and therefore better results.

Material and methods: N = 405 patients with intraperitoneal shunt insertion from the years 2006–2013 (Follow-up period ranges from 2 to 9 years with a 5,9-year mean follow-up period) were retrospectively analyzed with a special focus on the possible peritoneal catheter complications after laparoscopic shunt insertion. In our department all the peritoneal catheters in ventriculoperitoneal shunting are inserted laparoscopically, when there is no contraindication for this technique.

Results: We had 0% peritoneal catheter misplacement rate with help of the laparoscopic technique. In two cases (0.49%) injury of the small bowel could be repaired immediately with no further action required. In two cases umbilical hernias have been accidentally discovered and the repair of the hernias took place in the same surgical session. As this technique helps us to control the shunt position intra-peritoneally by direct laparoscopic vision, the patients spared an extra radiation exposure, to control the position of the peritoneal catheter. A diagnostic laparoscopy is also possible if needed. The time of the operation is shortened in comparison with the needed time, which is mentioned in literature, for the open laparotomy and of course the needed anesthesia and its possible risks and complications decreased.

Conclusion: No revision surgeries were required because of any misplacement of the peritoneal catheter, no additional technique related risks compared to the open surgical technique, no abdominal x-rays were needed, the operation time is shortened and the dose of anesthesia needed is decreased and of course its possible side effects' rate is also decreased. Another great benefit of this technique is the possibility of accidental diagnosis of intra-abdominal pathologies. Also, if a surgical treatment of this accidentally

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discovered intra-abdominal pathologies is needed, it can take place in the same surgical session. No prolonged surgery time as the laparoscopic technique is much easier, controllable and fast.

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1. Introduction

Since 2001, our Department of neurosurgery has been inserting the peritoneal catheter of ventriculoperitoneal shunts with endoscopic laparoscopies. In our hospital neurosurgeons and general surgeons have a standardized operative procedure to perform a ventriculoperitoneal shunt insertion. In our department, endoscopic laparoscopic surgery is the first chosen method to implant the peritoneal catheter.

In 2006 our department published our excellent results in peritoneal catheter placement through the laparoscopic technique on 151 patients (Bani et al., 2006 [1]). We continued using this method as first-line-procedure seeking the patients' maximal benefit with minimal risks and complication.

As mentioned in the literature there is a 2–4% misplacement rate of the peritoneal catheter placed through the open laparotomy procedure. In addition to the previously published studies [1–10], here in our present study we are going to report our further experience with the laparoscopical insertion of the peritoneal catheter in 405 patients with 0% peritoneal catheter misplacement rate in addition to many other advantages of this technique.

2. Material and methods

Retrospective analysis of N = 405 patients from the years 2006–2013, who experienced ventriculoperitoneal shunting with laparoscopic insertion of the peritoneal catheter. The Patients' ages range from 6 years to 89 years (238 males and 167 females). Since 2001 our department of neurosurgery always follows the laparoscopic technique in implanting the peritoneal catheter of ventriculoperitoneal shunts when there is no contraindication for this technique. The Neurosurgeons and general surgeons perform their parts of the operation simultaneously which shortens the operations time to about 30 min. In our department all the peritoneal catheters in all ventriculoperitoneal shunt cases are inserted laparoscopically, except newborns and patients with abdominal scars

resulted from previous multiple abdominal surgeries. Indications for ventriculoperitoneal shunting was intra-ventricular hemorrhage in newborns, normal pressure hydrocephalus, and after a subarachnoid hemorrhage. The BMI did not play a crucial role.

A chi square analysis was performed to compare our results with historical controls given in the literature, with a peritoneal shunt misplacement rate of 2–4% given in various publications.

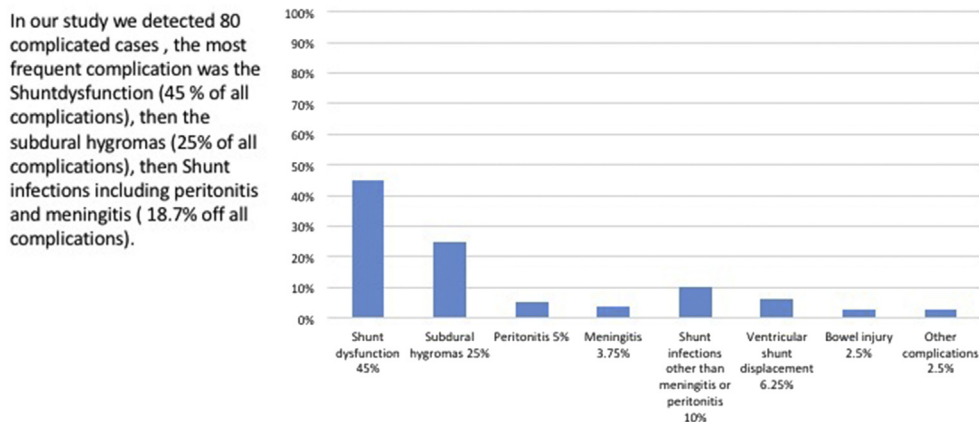
In all cases a written consent was achieved after description of the planned routine procedure and possible complications.

All patients are seen by the general surgeons one-day prior surgery to inspect the abdomen and to detect scarring from previous surgeries or find other pathologies. Theoretically one-day prior surgery, we can decide to switch the intervention to the open surgical implantation of the peritoneal catheter if the abdominal situation is too complicated.

Procedure descriptions of surgery:

1. 5 mm incision of over right rib cage.
2. 5 mm retro-auricular incision.
3. Tunneling the two incision sites and introduction of the catheter subcutaneously.
4. Kocher's point (right side) incision and burr hole. The ventricular catheter is inserted and connected to the peripheral catheter after tunneling to the retro-auricular point.
5. The general surgeon is already called and takes over the procedure, in order to insert the peritoneal catheter laparoscopically parallel to closure of the cranial and retro-auricular incision.
6. Insufflation of gas intraperitoneally after infra-umbilical incision.
7. Insertion of the laparoscope followed by insertion of a trocar then introduction of the peritoneal catheter intra-abdominally through the trocar under direct visualization.
8. Checking the correct function of the Ventriculoperitoneal shunt by pumping the ventile and visualization of fluid out flow from the peritoneal tip intra-abdominally.

Table 1
Frequency of shunt complications.



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