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LAPAROSCOPIC SURGERY IN THE VISCERAL SURGERYTh. C. Boettger, I. Baća¹

Since the introduction of video - laparoscopy in the mid - 80 almost all general surgery standard surgeries in specialized centers were performed laparoscopically. Some of the interventions like the laparoscopic reflux surgery, the cholecystectomy and minimally invasive hernia surgery have more or less completely replaced the conventional method. For systematic reasons and due to the huge number of diseases, only a few examples were chosen.

ESOPHAGUS AND ESOPHAGUS RESECTION

The laparoscopic, i.e. toracical approach with gutar-tige esophagus disease like epiphrenic esophagus diverticles or the intramural benign tumor of the gullet are applied in our clinics as standardized surgery procedures with all the benefits and advantages of the minimally invasive approach.

Regarding the experience gathered in the past years in the major centers in connection with treatment of malignant esophagus diseases with the laparoscopic and thoracical procedure, this procedure has become more and more significant in our clinics. Conventional esophagus resections even today have a clinical lethality of 10% and a morbidity of 40%, mainly caused by post-surgery pulmonary problems with multi-morbid patients.

A number of researches clearly proof that the minimally invasive procedure gives a reduced trauma in approach and less post surgery pain and a shortened recovery period. Pulmonary complications are therefore found at less degree. Still, esophagus resections under minimally invasive treatment have been published so far only in very few individual cases.

Usually in such cases thoraxopically only the esophagus was prepared, but the abdominal and cervicular part operated in conventional procedures. Accordingly and because of the small number of cases no difference could be found between the conventional and minimally invasive procedure.

First experiences have been gathered with the laparoscopic transhiatal esophagus resection with cervical

anastomosis. Laparoscopically the lymph nodes dissection can be done from the truncus coeliacus to the central mediastinum with the same oncological quality as with conventional procedures.

After the results found so far, the laparoscopic procedure even with esophagus resections can significantly decrease the morbidity and lethality. We have operated by now 10 patients with this method. Only in one case we could find a cervical anastomosis insufficiency (insufficiency rate conventional surgery 30%), none of our patients died. The patients stayed only the first night at intensive care and were given already on the first day after the surgery oral food. The stay in the hospital was 11 days against 22 with conventional procedures.

HIATUS HERNIA AND REFLUX SURGERY

In the meantime the laparoscopic approach is considered when treating a large hiatus hernia, a paraesophageal hernia and its extreme version - the "upside down stomach", or with the surgery treatment of the reflux disease, a standard procedure.

The reflux-esophagitis has been treated over years exclusively conservatively. After introduction of the laparoscopic fundoplication in 1991 it came to a sudden increase of numbers of surgeries. In some countries this surgery has almost completely replaced the conservative therapy.

Lundell could show in a prospectively randomized research, that the laparoscopic anti - reflux surgery is dominant over a permanent medication with 40 mg Omeprazol. Only at an increase of doses onto 80 mg the results equal.

Based on this the indication for the surgery is usually given only if the symptoms despite consequent application of a proton pump blocker persist after 12 months or return, then the doses has to be increased for the patients comfort or the patient declines permanent medication.

Post surgery complications are found at some 5% of cases. Very rare is a esophageal perforation or artifi-

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cial truncular vagotomy, it is mainly later bleeding, i.e. spleen lesions that appear. We are already monitoring over 300 patients that were treated with a laparoscopic fundoplication. In the meantime 40 - 50 patients are operated annually for reflux esophagitis.

A post surgery dysphasia is after a 360° collar relatively common (20%), but last only very shortly, it is solved usually with a one time bougation.

We prefer a semi fundoplication by Dor, where the fundus is sown ventrally onto the esophagus under reconstruction angle of His. Typical complications of the fundoplication like dysphagia or a gas bloat is found rather rarely, as the results of a prospective randomized research after the semifundoplication (Toupet, Dor, Thal) shows. The results of all surgery procedures are equally to a symptom control at 90 - 95%.

STOMACH SURGERY

Today's rather rare ulcers perforation in the stomach or the duodenum should, if possible even independent from the diagnosis and the duration of perforation be done laparoscopically. The laparoscopic over-sawing of the ulcers is burdened with a significantly less rate of wound infections and pulmonary complications than with the conventional procedure.

Also with treatment of benignant tumors and GIS tumors of the stomach, the wedge resection of the magenwand made laparoscopically, is an option.

The already developed new technologies and today's instruments we have at disposal enables us almost classical resections in the stomach, like Billroth I or Billroth II resection, as well as simple and extended gastrectomies with chosen indications with the help of minimally invasive procedures.

Even we will find only few written materials on experiences with the part of stomach resections at internal level, we in our clinics have gathered experiences with the entire spectrum of interventions in stomach interventions like wedge-, partial resection or gastrectomy. Ideal indications are benignant processes.

WEDGE RESECTION OF THE STOMACH WALL

The keeping up of oncological radicalism principles with carcinomas can be realized with gastrectomy laparoscopically, all decisive surgery steps can be done adequately with the oncological standard laparoscopically. The laparoscopical gastrectomy is surely technically possible and shows in results all known benefits of the minimally invasive technique for the patient: fast mobilization, smaller usage of analgetics, smooth start of the darmotility. Especially for the palpativ gastrectomy in connection with quality of life,

we see in future a good indication for the laparoscopic procedure.

The surgery technical efforts and costs and the requirements for laparoscopic readiness of the surgeon are to be evaluated as very high, which limits a fast wide application of this OP technique.

In future in studies evaluating goal parameters like no recidivism and long term survival are to be reviewed in order to get a sufficient basis for the evaluation and further optimization of the procedure of laparoscopic gastrectomy. Until then the technique doesn't give any standard procedure and should be only applied in laparoscopical centers.

In case of malignant stomach diseases based on good prognosis and the small rate of incidence of lymph nodes metastasis in the past years both endoscopic and laparoscopic limited resections were developed. Advantage of the laparoscopical wedge resection is the extraction of the entire wall and creation of a safety distance, so that a differentiation between T1a and T1b because of the differing metastasis risks is necessary - can be done.

Prospectively randomized research done by Japanese authors could proof that at an early stage of stomach carcinoma the laparoscopic stomach resection is superior towards the purely endoscopic procedure in regard of return, survival and complication rates.

Advanced stomach cancers can be operated with the same radicalism as in conventional procedures. Based on the currently unreliably evaluated efficiency and effectivity the indication for the minimally invasive procedure is to be defined for every individual case.

STOMACH SURGERY WITH ADIPOSITAS PERMAGNA

In case of the adipostas the surgery procedures are accepted as therapy of choice conservative refractory adipositas permagna. Laparoscopically done interventions, in particular the implantation of a stomach band or a stomach bypass have been significantly improved based on the opinion of surgeons. The surgical procedures are only a support to the patient to get hold of the overweight problems.

For this all preconditions are given that need to be complied with by the patient to have such a surgery done.

The criteria for such a stomach band surgery are as follows:

- BMI > 40 (meaning Adipositas grade III)
- No success with other diets
- Cosurgery of the patient
- The overweight can not be result of consummation of sweets (for the stomach band)
- Eventual consequential diseases like high blood pressure

Besides this a psychologist evaluation is needed, as well as an opinion by an endocrinologist and a diet consultant (the surgeon will give the needed orders). These evaluations are sent to the medical insurance together with the one issued by the surgeon. It may happen that the patient needs to be examined by an appointed physician of the medical insurance institute. In case of the stomach band the laparoscopic placement of a silicon band with a port system, which is positioned under the cardia and segments the stomach as a watch glass.

The pouch formed this way, as well as the artificial narrowness by the stomach band regulate mechanically the food consumption with the psycho-mental, decisive effect of a quick feeling of saturation - fullness of stomach. In case of a stomach bypass - also called gastric bypass or Roux-en-Y by-pass is cut with a string and a small "pre stomach" is created. The small intestine is cut through and connected with this pre stomach. The remaining stomach and the duodenum are by-passed. Food is in this case flowing from the gullet into the smaller stomach and directly into the small intestine.

LAPAROSCOPIC CHOLECYSTECTOMY

The laparoscopic cholecystectomy has in the meantime become the "gold standard" in the therapy of problems with the gall bladder. In our clinics we have annually over 600 gallbladder surgeries, of which 95% are done minimally invasive. Even a liver cirrhosis, coagulation problems or a gall bladder empyema are by themselves no contraindication. In case of previous surgeries in the upper abdomen for the experienced surgeon an intervention in the laparoscopic procedure is easily done. In our patient bases some 10% of the patients already had a form of upper abdominal surgeries and the rate of transfer onto the new methods doesn't differ from the previously operated patients. Alone the suspicion of carcinoma in case of a shrunk gall bladder seems to focus reasonable onto a conventional procedure.

The rather high rate on injuries of the gall bladder canals in the beginning, could be decreased after gathering more experience onto below 0,05% and the morbidity onto below 5%, with our own patients onto 0,1%, respectively 3%.

The further development of instruments has led to a miniaturization of the intervention canals. In the meantime the instruments have a diameter of 2 mm instead of the previous 5 or 10 mm. This has resulted, as one of our own prospective study shows in a better cosmetic result along with a tendency of application of less painkillers. Only a half of the patients need once

20 drops of Novalgin and the post-surgery stay could be decreased onto 3 days.

The laparoscopic revision of the gall bladder canals in case of choledocholithiasis could not be implemented because of the long time needed and other possibilities. The rate of success is between 70 and 95% at a morbidity of 1 - 12%. The therapeutic splitting is established with pre-surgery ERCP, EPT stone extraction and early elective cholecystectomy. The success rate of this procedure is at 90 - 95% with a morbidity of 15% and a mortality of 1%.

LAPAROSCOPIC APPENDECTOMY AND COLON SURGERY

The indication for the laparoscopic procedure in case of doubt of an acute appendicitis is subject of controversial discussions. In a meta analysis from over 20 prospectively randomized studies only few advantages could be found for the laparoscopic procedure in comparison with the conventional methods. In our prospective quality control we could see with about 300 appendectomies annually in a comparable patients collective after opened procedures at 12,5% effects with the wounds against 2% after minimally invasive surgeries.

The laparoscopical procedure therefore has become a procedure of choice in our clinics and is managed by all our employees.

The post surgery recovery was after laparoscopic procedures 3 days shorter than with conventional ones.

Along with the cosmetically convincing results (two 0,6 cm long incisions at the pubic hair border, one 2,5 cm long almost invisible incision in the navel area) we see especially with adipous patients significant benefits of the minimally invasive procedure, since the big stomach incision is not applied anymore with its morbidity.

An argument of prolonged surgery/surgery times and time for preparation, as well as higher costs can not be applied here, since we could find no difference in time during our practical experiences.

Laparoscopic duodena surgery

The laparoscopic sigma resection in cases of acute or chronically sigma diverticulitis has to be regarded as standard today. It is not justifiable why such an intervention is to be done through a large median lower laparotomy, when it can be done the same way over a 4 cm long cut through the symphysis, where the patient is hardly disturbed and can be released home often only after 6 six days, which is when after conventional interventions the patient is just being prepared for food consumption.

Also, with the surgical treatment of M. Crohn, colitis or multiple polyposis with or without the formation of

pouch, the minimally invasive approach is the method of choice in our clinics.

If one, on the other hand sees, that it is mainly young patients and that the intra-abdominal trauma is always high, we think that with compliance of other centers of experience, the benefits of a laparoscopic approach - like fast recovery, maintenance of the full abdominal wall and particularly the cosmetic result speak for themselves.

Benignant colorectal diseases let us believe in connection with laparoscopically achieved results on a long-term basis identical results as in conventional procedures, since in the short-term period the clinically relevant benefits for the patients could be evidenced through the minimally invasive procedure.

1. faster reconvalescence
2. reduction in post surgery complications
 - post surgery ileus
 - abdominal wall complications (infection of wounds, hernia)
3. shorter hospitalization
4. faster return to normal activities
5. less blood loss
6. less immuno suppression

An "outcome" Analysis for the evaluation of the clinical relevance of medical/health goals by physician and patient proofs on the example of the laparoscopic gall bladder extraction that the life quality index "quick re-establishment of full physical readiness (fitness "To be the old self again") is given a key role in the choice of methods.

In a comparison of methods "laparoscopic vs. conventional" the following parameters are highlighted:

1. traumatization of the abdominal wall
2. retracting measures
3. changes of surrounding in the peritoneal cave
4. local trauma on the targeted organ
5. prolongation and duration of the preparation

Based on the above especially colorectal resections, characteristic by large laparatomies and long-term retractions of abdominal walls and intestinum in conventional procedures, the laparoscopic procedure shows the following benefits:

1. less influence onto the post surgery lung functions
2. reduced pain symptoms despite less pain killers given
3. faster normalization of the gastro intestinal function
4. shorter fatigue syndrome
5. improvement of life quality

The goal of an optimization of the therapy comfort will remain to be the removal - transformation of con-

ventional procedures, so that along with all other benefits of the laparoscopic intervention accompanied by a minimal aggressive surgery trauma, an improvement of the oncological result by further development of the used techniques and qualification of the operating surgeon will be added.

With more than 400 laparoscopic colon resections with benignant diseases we could through our clinic internal quality controls clearly proof the superiority of the laparoscopic procedure in regard to the complication rate, the post surgery life quality (like pain, fatigue syndrome, costs etc.).

After now more than a decade of laparoscopic colorectal surgery, the controversies regarding benefits and risks are mainly limited onto the malignant part. The introduction of an advanced minimally invasive technique has brought us to new methods of approaches to malignant tumors, which on the other side have impact onto the oncological results of patients with cancer.

In the evaluation of the existing results of studies - for the patient with tumor who has undergone a laparoscopic surgery, significant benefits arise regarding the survival rate.

The surgical trauma per se (conventional vs. laparoscopic) with its effects onto the local immune response in cases of carcinoma, as well as in connection with potential growth factors of the metastasis is taken into consideration as possible cause for this phenomena.

This journey of one decade has also brought us to new insights regarding the effects of surgical interventions onto the patients. It has also shown the importance of the immediate post - surgery time onto the direct tumor growth in increased stress situation.

These insights will hopefully lead to better surgical methods and new adjuvant therapies, increase the survival rate and decrease the return rate with cancer patients.

The acceptance of the fast growth of the laparoscopic techniques in the colorectal surgery proofs only the requirement of a wide qualification, problem oriented, since for quite some time now there is no doubt that qualifiedly applied techniques have been properly established in this part of surgery.

For the driving force oriented side "the consumers" - the patients, the benefits of a reduced procedure and less surgery trauma are obvious and clear, so we should not expect a drawback in the implementation of these procedures. This aspect is not only supported by the various studies, but also by the term short-term benefits. The also very actively involved "offering side"

- knows all the options of the laparoscopic techniques. One doesn't need to have any prophetic gift to realize the dynamics of this development process, despite possible drawbacks in the power of transformation within the conventional colorectal surgery.

Also, the fact that the success of laparoscopic interventions on the colorectum depends at the highest grade of the qualifications of the surgeon, is the decisive influence onto the speed of wide application of this procedure.

Therefore it can be expected and wished, that the laparoscopic technique will remain for a reasonable period of time a therapeutically option in specialized medical care centers, which should not be seen as competition to the conventional technique, but primarily a speed giver.

In other words, one must be able to perform it and than it will be done and will be without doubt of great benefit for the treated patient.

With the long term results that are soon to be expected the curative intended laparoscopic resection of the colorectal carcinoma, a positive impulse with a new development push could be created. Therefore qualification must be obtained.

Since January 1993 to the end of 2003 in our clinics 360 laparoscopically assisted resection of carcinoma were done. We already have the long term results of them.

The cumulative survival rates /Kaplan - Meier/ without age correction and after 55 months is at 80% in all stages of the curatively operated group. In stage I it was 94%, stage II 82% and in stage III 60 %.

In another prospective study in Bremerhaven on 20 laparoscopic rectum sections, both a inspectoral and angiographic, but in all cases an intact mesorectum could be found.

Due to the enlargement effect of camera systems the performance of a total mesorectum excision is ideally possible.

While in the open procedure problems with bladder emptying and the sexual functions could be noticed in 30 - 50%, laparoscopically the important plexus hypogastricus, which is crucial for the bladder could be significantly better visualized and saved.

Post surgery problems in this part we could find after laparoscopic interventions only in 5%. Regarding the scope of the resection, there is no differences between the open and laparoscopic procedure. Prospective and retrospective studies on comparison show unanimously that the resection volume, the proximal and distal safety distance and the number of extracted lymph node doesn't differ.

The previously often seen implantation metastasis can be found by adequate measures only in up to 1,4%. The

incidence is therefore within the range of conventional surgery, which can be found in large series and a frequency of 1,0%.

In a prospective supervision study of over 400 patients, after 22 months no difference could be found between the returning rates and the survival time between the conventional and the laparoscopic procedure.

The post surgery morbidity and mortality is in many studies lower after minimally invasive interventions. The anastomosis insufficiency that scares all experts is in cases of rectum carcinoma independent from the applied procedure and in particular of the resection height, the sex of the patient and dependent on a possible previous radiation, so that with resections this is uniformly at about 15%.

Further, even if more rare indications are the laparoscopic treatment of istrogenous colono perforations after coloscopic extraction of polyps and the segment resection with benignant polyps.

A further development of minimally invasive colon surgery is the transanal micro-surgical extraction (TEM) of benignant rectum polyps and early stage rectum carcinoma with the surgery rectoscope. With a medium duration of stay of 4 days, we could see with over 550 patients a morbidity of 3,4% and no post surgery death case. The long term results are if viewed long - term and through comparing researches better than the transient extraction with the Park widener and less invasive than for instance rectotomia posterior. "Low risk" (lack of lymph vessel invasion, well to moderate differentiated).

T1 tumors have, based on these researches and after local extraction the same prognosis like after trans-abdominal surgeries (5 - years survival rate 79% vs. 81%), since the risk of lymph vessel metastasis is only 3%. The surgery risk is significantly lower and the post surgery life quality is significantly better. With advanced tumors or "high risk" malignoms this surgery technique is due to the incidence of lymph nodes metastasis in 12-83% only acceptable as palliative measure or with patients declining surgery.

ADRENAL GLAND SURGERY

In the shortest time the minimally invasive endoscopic procedure became the "gold standard" in the adrenal gland surgery. The small targeted organ with mostly benignant only few centimeters big neoplasts and the ablative character of the adrenalsctomy, which saves the surgeon of complex reconstructions.

The size of the organ is in disproportion to the relatively large and complex procedures and access routes in conventional surgery.

The indications for surgery of near kidney tumors is defined for a long time now and should not be changed by new surgery methods. Ideal indications for a minimally invasive procedure are hormone active adenomas at Conn or Cushing syndromes as well as hormone inactive tumors up to a size of 6 cm. In individual cases the extraction of large tumors may be justified laparoscopically.

Another good indication is the both sided by-kidney hyperplasia with otherwise uncontrollable M. Cushing or ectopic ACTH - production.

Pheochromocytomas may, after previous pretreatment with alpha blockers also be surgically treated with minimally invasive procedures. Contraindications are adrenal gland carcinoma, koagulopathia, cardio-pulmonary limitations of functions and pregnancies.

The central location of the adrenal gland has already contributed to four different minimally invasive approaches:

1. Laparoscopically from ventral
2. laparoscopically from lateral
3. retro-peritoneoscopically from dorsal
4. retro-peritoneoscopically from lateral

We preferred the laparoscopic approach from lateral.

All studies produced so far show unanimously that the laparoscopic adrenalectomy represents a safe and practicable surgery procedure with a complication rate (<2%) that is significantly lower than with the conventional procedure.

The benefits in comparison to open surgery are the ones of the "minimal access surgery" (less blood loss, less pain, short recovery, better cosmetic results).

The laparoscopic adrenalectomy is therefore, whenever practicable, to be used before open surgery.