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LAPAROSCOPY IN TREATMENT OF MALIGNANAT COLORECTAL DISEASES

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Summary

In the 1980s and 1990s, success of laparoscopic approach in cholecystetcomy introduced laparoscopy as a treatment option in various diagnosis. In past 20 years, laparoscopic approach became increasingly popular for treating patients with colorectal cancer.

Numerous studies have stressed the advatages of laparoscopic approach compared to open surgery which is quantified in reduced blood loss, earlier postoperative bowel movements, lower complication rates and shorter hospital stay. These advantages led to laparoscopic approach being considered as a modality of treting colorectal cancer. Shorter hospital stay lead to reduction of overall costs of treatment, inspite of initial higher cost of laparoscopic procedure.

Laparocospic approach in colorectal cancer treatment has better shortterm outcome, equal oncological safety and longterm results when compared to open surgery. Advantages and wider acceptance of laparoscopic surgery for colorectal cancer could improve quality of care of oncological patients and further reduce cost of treatment if implemented along with multimodal perioperative care program (enhanced recovery).

KEY WORDS: *laparoscospy, colorectal cancer, minimally invasive surgery*

LAPAROSKOPIJA U LIJEČENJU MALIGNIH BOLESTI DEBELOG CRIJEVA

Sažetak

Krajem 80-tih i u početcima 90–tih godina prošlog stoljeća uspjesi laparoskopskog pristupa kod kolecistektomije otvorili su put za upotrebu ove tehnike u raznim bolestima. U posljednjih 20 godina, laparoskopski pristup je postao popularan izbor za liječenje pacijenata s rakom debelog crijeva.

U mnogim studijama dokazana je prednost laparoskopskog pristupa u usporedbi s otvorenom operacijom koji se očituje kroz manje gubitke krvi, raniju uspostava motiliteta crijeva, nižoj učestalosti komplikacija i kraćim trajanje boravka u bolnici. Sve navedeno je dovelo do prihvaćanja laparoskopskog pristupa kao jednog od modaliteta liječenju raka debelog crijeva. Smanjenje trajanja boravka u bolnici dovodi do smanjenja ukupnih troškova liječenja, unatoč činjenici da su veći inicijalni operativni troškovi.

Laparoskopski pristup u liječenju raka debelog crijeva pokazuje bolji kratkoročni ishod, ima jednaku onkološku sigurnost i jednaki dugoročni ishod kao i otvorene operacije. Prednosti minimalno invazivne kirurgije mogu poboljšati kvalitetu skrbi onkoloških bolesnika i dovesti do dodatnih ušteda u liječenju uvođenjem programa multimodalne perioperativne skrbi.

KLJUČNE RIJEČI: *laparoskopija, kolorektalni karcinom, minimalno invazivna kirurgija*

INTRODUCTION

Despite the reports of decrease in cancer Incidence, cancer is still the leading cause of death worldwide (1). Small percentage of malignant diseases is genetically determined, most of them ocurr due to biogical responses to envitonmental factors (2,3). Intervenstions targeted on primary prevention are based on reduction of tabacco and alcohol consumption and dietary recommendations (4).

As for the terapeutical approach, achievements of laparoscopic cholecystectomy during the late 1980s, set foundations for contemporary application of laparoscopy in various entities (5,6,7). Amongst most common benign and malignant diseases which require surgical therapy, laparoscopic treatment of colorectal carcinoma achieved the best results in level of se procedure (8), postoperative recovery time (9) and longterm survival (10,11).

Hence, in past 20 years, laparoscopic approach became a popular choice for treatment of colorectal carcinoma. Several studies stressed above mentioned benefits to which reduced loss of blood, earlier postoperative bowel movements, reduced morbidity and shorter hospital stay were added. All this led to laparoscopic approach being recognized as adequate and safe addition to conventional surgical procedures for colorectal cancer (12-17).

Nevertheless, despite argumented advantages of laparoscopic approach, these are still not widely accepted in colorectal cancer treatment. The reason may be in long and steap learning curve, technical limitations and anatomical and pathological characteristics of patients and their disease. The aim of this paper is to review current data and evidence on laparoscopic surgery in coloretal cancer, with all advantages and disadvantages when compared to open approach.

TECHINCAL ASPECTS

Surgical principals of treatment of malignant diseases should be satisfied whether the approach is laparoscopic or open. Laparoscopic approach has certain particularities which render this method somewhat more demanding. Two dimensional view, due to standard video equipment, reduces the perception of depth. Direct tactile perception is also reduced, since the operation is conducted through small skin incisions through which the instruments are inserted. These disadvantages are compensated with the experience of the surgeon and his team. This also means that these operations may last longer than their open counterparts (19).

Longer operative time in laparoscopic approach depends on complex and technically more demanding parts of operation. In fact, operative time of laparoscopic procedures is comparable to open ones depending on team's experience due to long learning curve (18,20).

Main reasons for considering laparoscopic procedures more demanding is that operation is usually taking place in more than one abdominal quadrant and there is reduced tactile feedback which makes vascular structures control and anastomosis formation more demanding. Main drawbacks of these method, which were not substantiated by recent studies, were posibilities of port site metastases, incomplete lymphadenectomy and difficulties with exctracting the specimen after resection (13,21). Development of technology and improved and structured education successfully solved these issues. Finaly, most reports agree that learnig curve and surgeon's experience substantialy reduce operating time.

Blood loss and postoperative analgesia depends on invasiveness of surgical procedure. Results of recent meta analysis of clinical data demonstrated significant reduction of intraoperative blood loss and subsequent need for blood derivatives in laparoscopic compared to open procedures (22).

SHORTTERM RESULTS

Initial randomized studies showed shortterm results of laparoscopic colorectal surgery to be comparable and in some aspects even better than open colorectal procedures. When laparoscopic approach was adopted as a standard technique, a study that included 48 institutions (different surgeons) recruiting 872 patients was undertaken. It was shown in this study that even in experienced surgeon (20 or more laparoscopic resections) operative time is somewhat longer, but operativa technique gives better results, such as fewer complications and shorter recovery and hospitalisation time (14).

Substantial improvements in postoperative recovery of laparoscopically operated patients are manifested by earlier initiation of enteral nutrition and resuming normal eating habits, shorter hospital stay and return to everyday activities (11,23).

However, comparison of length of hospital stay between different institutions may be influenced by various factors. For example, socioeconomic status is associated with level of care in USA. In fact, the level of care is determined by patient's insurance company agreement. On the other hand, some countries have solidarity based health care systems, which foster equality in health care provision regardless of socioeconomic factors. When these countries are compared to USA with regards to length of hospital stay, it is shorter in USA (15,16).

Even when this is considered, hospitalisation length for colorectal cancer surgery in different countries has wide variations. Even in USA, postoperative hospitalisation after laparoscopic resection spans from 5 to 7 days (14,16,17); and its slightly longer in countries where health care is based on solidarity principals (11).

Advantagesof laparoscopic resection are best shown in early postoperative period and shorterm results viewed through studies of immune response in perioperative period (23,24). In early postoperative period, better cellular immune response is noted, manifested in white blood cell counts, CD4 and CD 8 T lymphocytes after laparoscopic resections when compared to open surgery (25).

Difference in immune response in various surgical techniques has been studied. IFN gama, which is produced in effectors of cellular immunity, Th1 cells, shows significantly higher levels after laparoscopic resection than after open ones. This represent immunological 'benefit' in reducing the activity of proinflammatory cytokines such as IL-1 (26).

Better preserved immune response and immunological function after laparoscopic surgery indirectly shows that there was lesser trauma when compared to open surgery. This also means that fewer postoperative complications, better results and diminuation of cost could be expected.

LONGTERM RESULTS

Immune response, escpecially cellular immunity, play a key role in lowering early postoperative recurrence rates in patients with colorectal carcinoma (27). Laparoscopic approach diminuates tissue trauma and lowers the physiological reponse to surgery immediately after the operation, it was believed that this implies better oncological outcome and better survival rates (27). Inspite of early promising results in favour of this premise, later reasearch did not clear that relation.

Regarding overall survival and disease free survival, local and distant recurrences and quality of life after colorectal cancer surgery there are no differences between laparoscopic and open (14, 15,16). Results of multicentric, prospective, randomized trials for rectal cancer patients regrding above mentioned parameters showed the same results (14-17,28).

Meta-analysis have shown that longterm outcomes are comparable in laparoscopic and open approach (29). Safety of the procedure, concerning oncological principals, is achieved mostly through experinece of the lead surgeon as well as the entire team.

On eof the reason why the laparoscopic approach was considered inadequate for patients with amignanat disease was conversion to open surgery. Most studies have shown this does not influence the longterm outcome (30). In most cases, reason for conversion was advanced stage of disease, technical reasons, extreme obesity or intraoperative complications. Higher morbidity in these patients and worse overall survival might be explained by this being mostly patients with severe commorbidities. Nevertheless, conversion in hands of experienced surgeon does not present a risk since the disease free survival remains the same regardless of surgery being performed laparoscopically, open or has been converted. Therefore, decision to convert laparoscopic to open surgery when indicated doesnot compromise the outcome (31).

Another controversial issue were port site metastases, due to which laparoscopic surgery has long been reserved for benign conditions (32,33). If oncological principals are obeyed in colorectal cancer surgery, minimized intestinal manipulation and atraumatic instruments, again the outcome is comparable. When the specimen is extracted, wound protectors or endobags are used and air is simultaneously released from the abdominal cavity.

Finaly, multicentric prospective randomized trials have cleared all the issues concerning laparoscopic surgery. It has been demostrated that there are no diferences in oncological outcome between laparoscopic and open colorectal surgery, that conversion does not pose anadditional risk for spread of malignant disease nad the rate of port site matestases doe not exceed the rate ofincisional metastase in open surgery, which is under 1% (16).

Postoperative hernias and adhesiones are results of every surgical procedure. Laparoscopic approach might have reduced the rate of postoperative hernias when compared to open surgery (35). The obvious reason is reduction of incision length and reduced postoperative wound infection rates in laparoscopic approach (36). Reduced formation of adhesiones and complications related to them, has been noted when laparoscopic approach was compared to open one (37).

ANALIZA TROŠKOVA

Laparoscopic approach proved to be applicable in a number of benign conditions such as diverticulitis, Crohn's disease, rectal prolaps and longterm efficacy in treatment of malignant conditions has been demonstrated, economic aspects remains an obsticle for wider acceptance of this approach. Earlier studies compared expenses of laparoscopic and open colectomy and provided a wide range of results. Certain studies showed increased cost of laparoscopic approach when compared to open surgery due to higher cost of expandible surgical material (38). This can lead to a conclusion that laparoscopic approach are less cost effective than the open alternative.

On the other hand, more contemporary studies have focused on other variables when economically comparing the two. Laparoscopic colorectal surgery is performed through small incisions, therefore has less complications related to infections and postoperative hernias compared to open colorectal surgery. Furthermore, laparoscopic colorectal surgery has lower rates of postoperative ileus, earlier initiation of enteral nutrition which also reduces infection rates. Moreover, smaller incisions contribue to reduced analgestics consumption, earlier verticalisation, hospital discharge and return to normal activities which all reduce morbidity and result in reduced costs of treatment.

To conclude, when these is taken into account, laparoscopic colorectal cancer surgery proves to be significantly less expensive than open colorectal surgery, despite initial higher cost. Average cost reduction is hard to define since studies were conducted over longer time period during which the prices of materials varied. Expenses were also very variable depending on country and even region where the study was conducted. The economic analysis show that the cost reduction is mainly derrived from reduced need for nursing and medicines. On the other hand, intense perioperative care modalities such as 'fast track' surgery protocols, also reduce some of the observed variables in open surgery and could narrow the difference in calculated expanses (39,40).

CONCLUSION

Laparoscopic approach is slowly becoming widely accepted as a method of choice in treating colorectal cancer. Operation performed laparoscopically have substantially better shorterm results, can be performed respecting all principals of surgical oncology, they are safe, which is confirmed by having comparable longterm results as open colorectal surgery. Laparoscopic surgery for rectal cancer demonstrated similar results, however in this type of surgery experience and surgeons technical skills proved to be quite important. All advantages of minimally invasive surgery may bring additional benefit to overall quality of care for the patient with malignant disease. Complementary beneficial could be introduction of multimodal (earlier) rehabilitation (enhanced recovery).

By reducing morbidity and quicker resumption of everyday activities, perhaps initialy more expensive, these procedures justify them in the long run.

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