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Surgical trauma and tumor dissemination

Minimally invasive surgery has been shown to be associated with less post operative pain, shorter hospital stay earlier post-operative recovery and faster return to normal activity than conventional surgery. Decreased metabolic stress after laparoscopic surgery is shown in clinical studies on hormonal changes after laparoscopic procedures. Serum levels of epinephrine, norepinephrine, glucose and CRP are higher after conventional surgery then after laparoscopy. Also a reduction of catabolism after minimal invasive procedures is shown.

Clinical studies also found a less pronounced proinflammatory response to surgical trauma in patients after minimally invasive surgery. The non-specific immune response appears to be less affected by laparoscopic surgery when compared with open surgery while the specific cell-mediated immunity is equally affected.

Based on diminished metabolic stress of laparoscopic surgery, the hypothesis has been put forward that laparoscopic surgery would be associated with improved oncological prognosis.

Tissue trauma is less in laparoscopic surgery due to the use of minimal incisions, meticulous dissection facilitated by image magnification and the absolute necessity to perform bloodless surgery. In the beginning of laparoscopic surgery there were concerns of a possible higher incidence of abdominal wall metastases after colon cancer resection.

Tumor growth at the site of the abdominal wall after laparoscopic surgery can be influenced by different mechanisms. Pneumoperitoneum, insufflation pressure, gas leakage, local ischemia at trocar sites can be of influence in the development of abdominal wall metastases. However clinical studies do not seem to show a higher incidence of abdominal wall metastases if proper precautions (like extraction of the tumor via an endobag and using woundprotectors) are taken into account.

In general animal studies show that laparoscopic surgery is associated with less tumor growth than conventional surgery. Most clinical studies between laparoscopic colon cancer resection and open resection show no difference in oncological outcome. Colorectal cancer in humans is considered to be non or at best weakly immunogenic. Evidence for this statement mainly originated from immunotherapeutic studies. Experimental tumors used in most models are more immunogenic and more sensitive for immunomodulation.

In theory the combination of non-specific perioperative immune upregulation and preoperative tumor vaccines would provide the patient with the ability to kill tumor cells immediately following surgery period through specific and non specific immune responses

In conclusion less traumatic surgery may be associated with oncological advantages that go well beyond less pain, quicker recovery and a shorter length of stay. Until now no human studies have however confirmed the sometimes promising oncological benefits after minimal invasive surgery shown in experimental studies.