

Optimal trocar selection/placement and patient positioning

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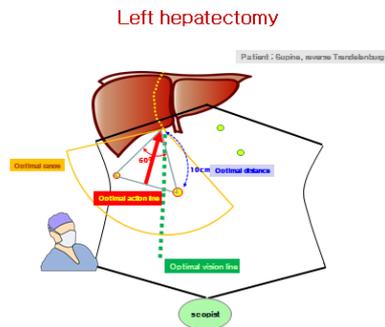
Laparoscopic liver resections (LLR) have been rapidly increased, and developed from minor hepatectomies including segmentectomies and wedge resections, to major hepatectomies. Especially, major LLR and LLR in difficult location require a lot of operation time and skilled operative techniques. So proper trocar placement provides optimal vision of the operative field, good access to target lesions, and a decrease in mental and muscular fatigue, and enhances proper surgical procedures reducing complications and the number of conversions from operative difficulties. We have to understand optimal ergonomics in laparoscopic surgery.

1. Straight line principle(Surgeon-Target-monitor axis is aligned in the same vertical plane)
2. Optimal optic angle(Optic angle is defined as the variable angle between the line of vision and the line of action The optimal position is at the optic angle of 0° , Optimal range of angle is between 60° to the left and 60° to the right)
3. Semicircular line(The placement of trocars along a semicircular line centered on the target organ is optimal, a line 16 to 18 cm long)
4. Triangulation (Baseball Diamond concept)
5. Manipulation angle (Angle between the 2 working instruments , Between 45° and 75° , The ideal being 60°)
6. Azimuth angle(Angle between the instrument and optical angle of the endoscope, Equal/ 30° each)
7. Elevation angle(Angle between the instruments and the horizontal plane , 60°)
8. Optical axis-to-target view (OATV) angle(90°)
9. I/E Ratio(The intracorporeal to extracorporeal length ratio of working instruments is equal or slightly less than 1)
10. Gaze down view

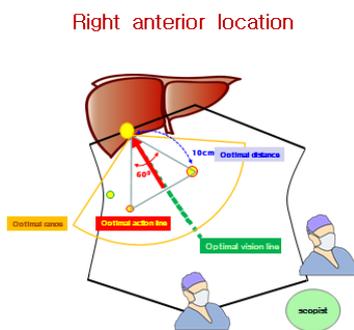
We Can apply Optimal trocar placement in Laparoscopic Liver Resection based on Ergonomic fundamentals

Conclusion ; Optimal trocar placement is paramount for safe and effective Laparoscopic Liver Resection.

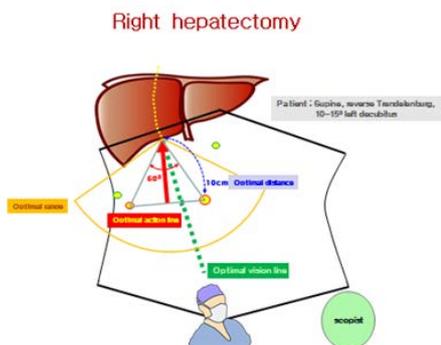
1. Laparoscopic Left-sided hepatectomy



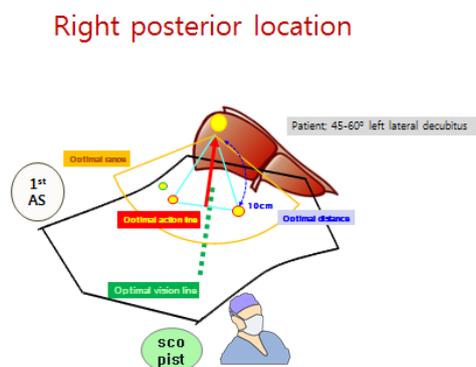
2. Right anterior location



3. Right hemihepatectomy



4. Right posterior location



Reference

1. Hanna GB, Shimi S, Cuschieri A. Optimal port locations for endoscopic intracorporeal knotting. *Surg Endosc* 1997;11:397–401.
2. Hanna GB, Shimi S, Cuschieri A. Task performance in endoscopic surgery is influenced by location of the image display. *Ann Surg* 1998;227:481–484.
3. Fingerhut A1, Hanna GB, Veyrie N, Ferzli G, Millat B, Alexakis N, Leandros E. Optimal trocar placement for ergonomic intracorporeal sewing and knotting in laparoscopic hiatal surgery. *Am J Surg*. 2010 Oct;200(4):519-28.
4. Ferzli GS, Fingerhut A. Trocar placement for laparoscopic abdominal procedures: a simple standardized method. *J Am Coll Surg*. 2004 Jan;198(1):163-73.