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THE FOUR-PORT LAPAROSCOPIC TAPP CONFIGURATION FOR EASY LEFT SIDE DISSECTION- THE BELIEVERS PORT POSITIONS.

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ABSTRACT
The struggle for dissection of the left side in a case of bilateral inguinal hernia using the conventional three-port technique in TAPP repair, faced by many surgeons, has remained unaddressed. This is especially true in the Indian scenario where the length between the xiphisternum and the umbilicus is greater than the length between the umbilicus and the pubic symphysis. We accommodated one more port on the left side of the camera port and tested the ease of dissecting the limits of Laparoscopic TAPP dissection on the left side using these ipsilateral ports. We called the final configuration, The Believers Port Positions. This modification made the dissection of the left side much easier, faster and with lesser complications at the cost of an additional small port. This case series describes our experience with the Believers Port Positions in 12 patients.

KEYWORDS: Port positions, TAPP, Bilateral Inguinal Hernia, Laparoscopic Hernia Repair, Believers Port Positions

INTRODUCTION
Maurice Arregui is believed to have published the first series on Laparoscopic Transabdominal Preperitoneal Hernia repair using a mesh covering the Myopectineal Orifice, performed first in October 1990[1]. The classical port position for bilateral TAPP is the three port technique in which, the central port is a sub-umbilical or a supra-umbilical, 10-12 mm port for the Laparoscope and the lateral ports are two 5 mm ports 5-7 cm away from the camera port, for working instruments[2](figure 1). In this technique, the surgeons who are right-handed in the majority use the right 5 mm port for the dissection instruments and the left 5 mm port for retraction instruments. In this arrangement, it is easy to operate on the right-side hernia, because the right-handed dissecting instrument tip has a good range of movement from the medial limit of dissection to the lateral limit of dissection. Also, the left retraction hand can effectively pull down the peritoneal tissue aiding in the dissection. When it comes to the left side the surgeons may prefer to stand either on the left side itself or shift position to the right side of the patient. In both these cases, the left hand can retract the peritoneum very well from medial to lateral boundaries of dissection, whereas the right-hand instrument can only do a good

dissection on the lateral part on the left side. The dissection of the medial part of the left side becomes difficult due to the presence of the medial umbilical ligament beyond which the peritoneal incision cannot be extended. Some surgeons try to overcome this difficulty by shifting the dissecting instrument to the left side and the retracting instrument to the right side. However, this becomes very cumbersome for most, to dissect using the left hand especially in adverse situations like adhesions, bleeding etc. The distance between the pubic symphysis and the umbilicus is a major deciding factor in this. A patient having sufficient distance between the pubic symphysis and the umbilicus makes it easy for the surgeon to perform a left-sided dissection with the dissecting instrument held by the right hand, especially on the medial side. However, in the Indian scenario where most of the patients have a shorter distance between the pubic symphysis and umbilicus[3], it becomes difficult to do the left-side dissection (figure 3,4).

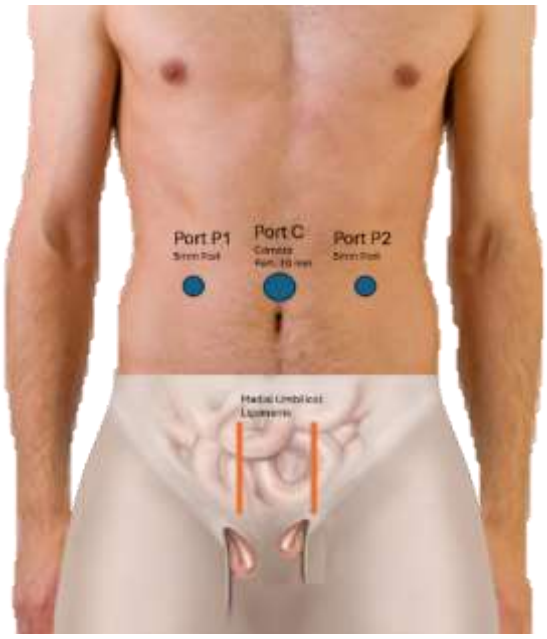

Figure 1: Conventional Port Position

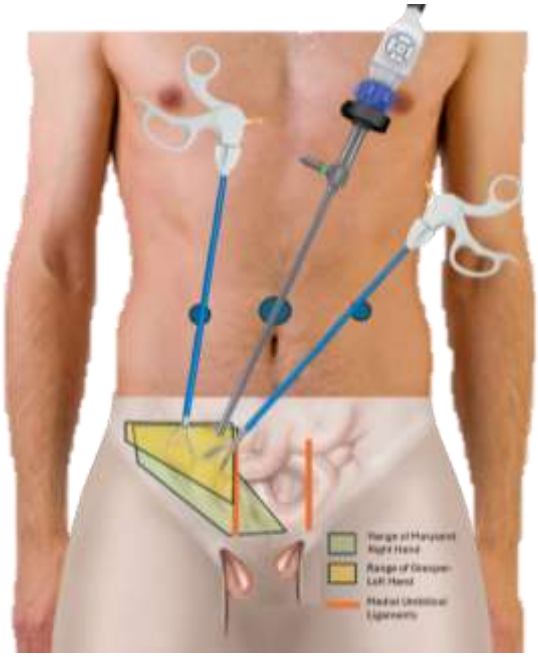

Figure 2: Areas of dissection possible in the right side using Conventional Ports

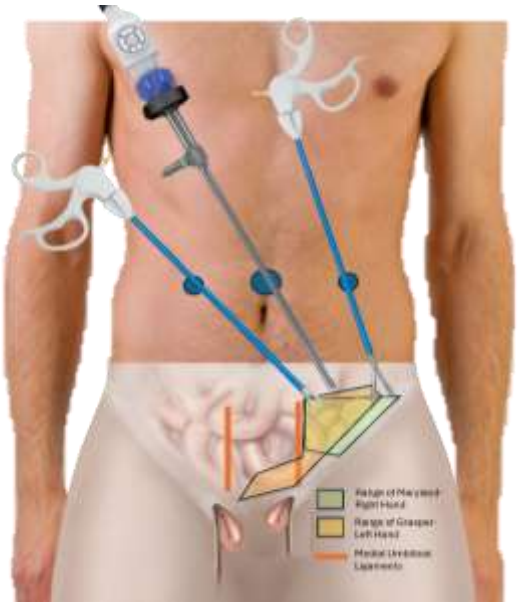

Figure 3: Areas of dissection possible in the left side using Conventional Ports. The yellow area is of left-hand instrument

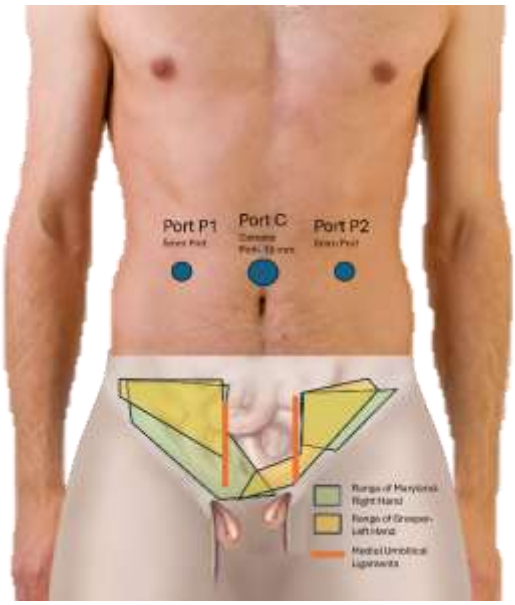

Figure 4: Combined areas of dissection with conventional ports. The yellow area represents dissection with non dominant left hand

We devised a technique to ease this difficulty of dissection on the left side by adding an additional port on the left side of the trocar so that two 5 mm instruments can be used for dissection of the left-sided inguinal area from the left side itself. We are presenting a series of 12 cases where this technique was used, with the results of using this additional port.

The fourth port was placed in the anterior axillary line along the horizontal level of the umbilicus and the conventional port was placed midway between the anterior axillary line and the central camera port. Proper care was taken to avoid the injury to the Inferior Epigastric Artery. The position of the right side 5mm port remained unchanged, midway between the anterior axillary line and the central camera port. We named this new configuration, "The Believers Port Positions" after the name of the institution we are affiliated to (figure 5).

CASE DISCUSSION

This case series consists of our experience on 12 patients, who were posted for Trans Abdominal Pre-Peritoneal repair of bilateral inguinal hernia in whom the new port positions were tried. All the procedures were done by the same surgical team in the same standardised technique as described below after obtaining informed consent from the patients.

In the Indian studies, the ratio of the length between xiphisternum and umbilicus and umbilicus and pubic symphysis is 1.6: 1[3]. Generally it is expected that, as the distance between the umbilicus and pubic symphysis increases, laparoscopic inguinal hernia repairs on both the sides become easier. The distance between the umbilicus and the pubic symphysis and the distance between the bilateral anterior axillary lines were measured in all the cases to check the compatibility of the new port positions in different situations. The procedure is explained in detail to the patients especially the need for an additional port, a possible slight increase in the pain and a slightly higher chance of port site hernia.

The patient is painted and draped, and the supra-umbilical 10 mm port is placed by open technique and designated the C port. The 1st working port (P1) is inserted into the right side, midway between the umbilicus and the anterior axillary line after transilluminating the anterior abdominal wall with the light from the scope to avoid the Inferior Epigastric Artery. Then on the left side, the first 5 mm port (P2) is placed, like on the right side midway between the anterior axillary line and umbilicus avoiding injury to the Inferior Epigastric Artery by transillumination as described above. The fourth 5 mm port (P3) is placed in the anterior axillary line under direct visualisation of the peritoneal cavity avoiding injury to the Descending Colon.

The extent of dissection in TAPP reaches medially 1–2 cm beyond the symphysis pubis to the contralateral side, cranially 3–4 cm above the transversalis arch or any direct defect, laterally to ASIS, and caudally minimally 4–5 cm below the ileo-pubic tract at the level of the Psoas muscle and 2–3 cm below the Cooper's ligament at the level of superior arch of the pubic bone[4]. Based on these guidelines, five reference points were fixed based on the limits of TAPP dissection to check the reach of both working instruments to each of these points, in both the left and right sides. These reference points are named by a notation for easy identification. The First Letter denotes the side ('R' for Right Side, 'L' for Left Side). The second Letter denotes the side of the hand using the instrument. ('R; For Right-Hand Instrument and 'L' for Left-hand instrument). The next 2 letters denote the reference point being tested. The naming of the reference points is shown in Table 1

FIRST LETTER	SECOND LETTER	THIRD AND FOURTH LETTER	
R (for Right Side Hernia)	**R** (Using the Right-Hand Instrument)	**MP**	Medial Umbilical Ligament
	L (Using the Left-Hand Instrument)	**LP**	Lateral Level of Peritoneal Incision- usually at the level of ASIS
L (for Left Side Hernia)	**R** (Using the Right-Hand Instrument)	**IT**	Ipsilateral Pubic Tubercle
		CT	Contralateral Pubic Tubercle
	L (Using the Left-Hand Instrument)	**IV**	Retro vesical space 5 cm above Pubic Symphysis

Table 1: Naming of the reference points

For example, the trial of touching the contralateral pubic tubercle from the right side using the right-hand instrument is indicated as RRCT. If the reach is easy, it is scored 1 and if the reach is difficult, it was scored 0. The reach of the instruments was checked by testing the ease of touching those points on both the sides by the left and the right instruments first in the conventional port positions (C, P1 and P2) and later in the left side by Believers Port Position, (C P2 and P3). The scoring table is shown below.

	Case 1	**Case 2**	**Case 3**	**Case 4**	**Case 5**	**Case 5**	**Case 6**	**Case 7**	**Case 8**	**Case 9**	**Case 10**	**Case 11**	**Case 12**
Height (Cm)	160	165	171	166	149	153	162	170	155	165	171	169	168
Weight (Kg)	63	90	95	75	50	53	68	86	62	71	98	88	90
XP	35	40	45	42	38	32	40	44	41	46	42	45	46
UP	16	22	20	19	16	16	16	20	18	22	16	20	20
UP/XP Ratio	0.46	0.55	0.44	0.45	0.42	0.50	0.40	0.45	0.44	0.48	0.38	0.44	0.43
AA	40	44	48	44	43	30	43	49	42	45	47	44	45
	CONVENTIONAL PORTS- P1 and P2 - **For RIGHT SIDE**												
RRMP	1	1	1	1	1	1	1	1	1	1	1	1	1
RRLP	1	1	1	1	1	1	1	1	1	1	1	1	1
RRIT	1	1	1	1	1	1	1	1	1	1	1	1	1
RRCT	1	1	1	1	1	1	1	1	1	1	1	1	1
RRIV	1	1	1	1	1	1	1	1	1	1	1	1	1
RLMP	1	1	1	1	1	1	1	1	1	1	1	1	1
RLLP	1	1	1	1	1	1	1	1	1	1	1	1	1
RLIT	0	1	0	0	0	0	1	0	0	1	0	1	1
RLCT	0	0	0	0	0	0	0	0	0	0	0	0	0
RLIV	0	0	0	0	0	0	0	0	0	0	0	0	0
	CONVENTIONAL PORTS- P1 and P2- **For LEFT SIDE**												
LRMP	1	1	1	1	1	1	1	1	1	1	1	1	1
LRLP	1	1	1	1	1	1	1	1	1	1	1	1	1
LRIT	1	1	0	0	0	1	0	1	0	1	0	0	0
LRCT	0	0	0	0	0	0	0	0	0	0	0	0	0
LRIV	1	1	1	1	0	1	0	1	1	0	1	0	0
LLMP	1	1	1	1	1	1	1	1	1	1	1	1	1
LLLP	1	1	1	1	1	1	1	1	1	1	1	1	1
LLIT	1	1	1	1	1	1	1	1	1	1	1	1	1

LLCT	1	1	1	1	1	1	1	1	1	1	1	1	1
LLIV	1	1	1	1	1	1	1	1	1	1	1	1	1
	BELIEVERS PORT POSITION - P2 and P3- **For LEFT SIDE**												
LRMP	1	1	1	1	1	1	1	1	1	1	1	1	1
LRLP	1	1	1	1	1	1	1	1	1	1	1	1	1
LRIT	1	1	1	1	1	1	1	1	1	1	1	1	1
LRCT	1	1	1	1	1	1	1	1	1	1	1	1	1
LRIV	1	1	1	1	1	1	1	1	1	1	1	1	1
LLMP	1	1	1	1	1	1	1	1	1	1	1	1	1
LLLP	1	1	1	1	1	1	1	1	1	1	1	1	1
LLIT	1	1	1	1	1	1	1	1	1	1	1	1	1
LLCT	1	1	1	1	1	1	1	1	1	1	1	1	1
LLIV	1	1	1	1	1	1	1	1	1	1	1	1	1

Table 2: The scoring table for various port positions. XP- Distance between Xiphisternum and Pubic Symphysis, UP- Distance between Umbilicus and Pubic Symphysis, AA- Distance between Anterior Axillary Lines on Both the sides.

While dissecting the right-side inguinal hernia, ports P1 and P2 are generally used. This gives good reach for both instruments, especially to the right-hand dissecting instrument in P1. The space of Retzius is dissected as much as possible medially, possibly till the left Cooper's ligament is visualised. The hernial sac is reduced and then the dissection of the right Space of Bogros is completed. Then both the working instruments are taken out and inserted into Ports P2 and P3, the retracting instruments in P3 and the dissecting instruments in P2 (P2 was used for retraction in the right side dissection (figure 5, 6). The left preperitoneal space after the arcuate line can now easily be dissected medially and laterally. The placement of mesh on the right side can be done easily with ports P1 and P2 and the placement of mesh on the left side can be done using ports P2 and P3. The authors have noted that, while suturing the peritoneum, It is much easier to use P1 and P2 for both the sides.

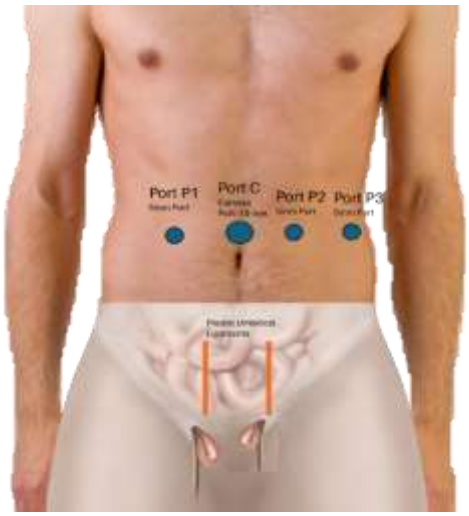

Figure 5: The Believers Port Position

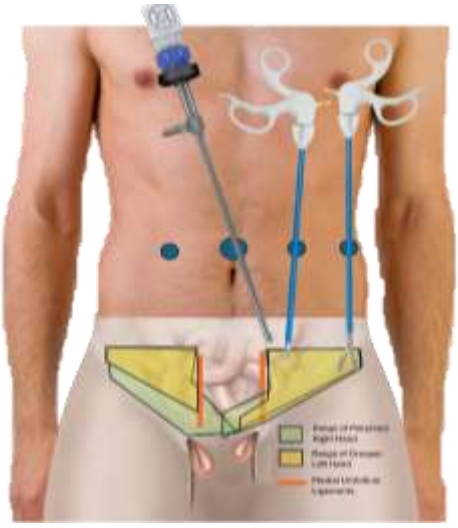

Figure 6: The extended area of dissection with Believers Port Positions. Green Zone is that of the dissecting instrument in the right hand.

DISCUSSION

In all the 12 cases mentioned above the left-sided ports made the dissection of the left inguinal hernia very easy, compared to the conventional technique. The only disadvantage that could be pointed out is that a small additional 5 mm port has to be made on the left side. Due to the technique of pre-emptive anaesthesia, which we routinely adopt in our surgeries the pain scores of the patients were similar to the pain scores in the conventional technique. The possibility of an increased chance of developing a hernia can only be assessed after a long follow-up period. We found the technique of locating the inferior epigastric artery by using transillumination of the abdomen by the laparoscope effective in preventing injuries to the inferior epigastric artery. The conventional 3 port technique is difficult on the left side, due to the lack of approachability to the medial space of Retzius on the left side by the dissecting instrument in the right hand. This can be solved to an extent by placing the ports more superiorly, especially in people with less distance between the pubic symphysis and umbilicus. In the Indian scenario especially in females these ports then come at the exposed parts of the belly while wearing a saree, which is cosmetically unacceptable. Placing the fourth port at the level of the umbilicus is cosmetically more acceptable and makes the surgery much more convenient and faster.

In people with increased distance between the umbilicus and the pubic symphysis, the access of instruments to the left side was better than those with a small umbilico symphysis length. However, this difficulty was solved by the Believers Port Position for left. This is because the reach of the anatomical landmarks improves with the ipsilateral ports. Some surgeons have the habit of shifting to the right side of the patient to get better triangulation of the left side. This can be avoided with the Believers Port Position and the patient can be operated from the left itself conveniently. The additional port on the left can sometimes help in providing an additional hand, especially while positioning the mesh, unrolling the mesh, tacking both the mesh and the peritoneal fold, and suturing. It also helps to accommodate a 5mm scope so that the 10 mm cannula can easily be used to extract the gauze piece, if it was put in.

CONCLUSION

Adding an extra port in the anterior axillary line and dissecting the left Inguinal area with these ipsilateral ports greatly increases the reach of the Laparoscopic instruments to the desired limits of dissection, making the left side inguinal hernia dissection much easier and faster. This new configuration of ports for Laparoscopic TAPP may be referred to as “Believers Port Position”.

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