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SURGICAL CONSIDERATIONS IN THE MANAGEMENT OF THORACO-ABDOMINAL ANEURYSMS OF THE AORTA

Cardiology

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ABSTRACT

Thoracoabdominal aneurysms are relatively less common aneurysm but are complex cases to manage. They extend on both sides of diaphragm to involve a variable portion of aorta. They become challenging as different cavities of body are involved and many abdominal visceral branches originate from this segment of aorta along with spinal and intercostal arteries as well. There may be fatal damage to these organs during surgery as a result of temporary occlusion of these arteries to facilitate bloodless field for surgery. In this study, we have specially emphasized on considerations of surgery of these complex aneurysms.

KEYWORDS

Aim : To study the clinical profile of Thoraco-abdominal Aneurysms and evaluate results of surgery using the standard technique.

INTRODUCTION :

It is mostly seen that aneurysms of the Aorta arise distal to the origin of renal arteries. There is less morbidity associated with resections in these cases. Morbidity and mortality increases with proximal abdominal or thoracoabdominal aneurysms[1]. These patients sometimes land up with fatal damage to vital abdominal organs such as the liver, gastrointestinal tract, kidneys and spinal cord[2]. This occurs during clamping of proximal aorta which is necessary for excision of the aneurysm and replacement of the segment with an appropriate vascular graft.

These extensive surgeries require thoracotomy as well as laparotomy for proper adequate exposure for taking control of proximal and distal normal aorta, excision and accessibility for difficult anatomic anastomosis[3,4]. However, the experience with such clinical cases is relatively less in view of its rare occurrence. It is difficult to manage these cases with justifiable expectancy and acceptable outcome in most cases.

However, it is now possible to have successful management of these extensive aneurysms in view of increased experience and operative techniques[5]. Long term survival is far superior to the natural history of such untreated cases.

MATERIALS AND METHODS :

A randomized prospective study was conducted at Department of Cardiovascular and Thoracic Surgery, G. S. Medical College and KEM Hospital. During the period from July 2014 to June 2019, 34 patients of Thoracoabdominal aneurysms were investigated and treated. Patients were evaluated clinically and radiologically. Out of these 34 patients, 16 underwent surgical repair during the same above mentioned period with standard described technique.

Patients in the study were assessed in the following manner :

1. Detailed history (symptoms and preoperative risk factors)
2. Clinical examination
3. Investigations (all routine blood and urine investigations, CT Aortogram)
4. Surgery (routine preoperative preparations, monitoring lines, general anesthesia, thoracoabdominal incision, dissection of aneurysm, heparinisation before clamping aorta, opening of aneurysm, identification of all important major visceral branches, island created including such arteries, graft anastomosis done with proximal followed by island and distal, haemostasis, closure with drain placement, patient shifted to ICU.
5. Follow up (monitored in ICU, blood investigations on 1st and 4th post operative day, antibiotics for 7 days, patient discharged by 10th day after surgery, followed up after 1 week, then monthly)

(1,2,3 for all 34 patients; 4,5 for16 operated patients)

OBSERVATIONS AND RESULTS :

34 adult patients with thoracoabdominal aneurysms who were investigated and 16 who were treated at the same hospital. The patients underwent surgery by standard institutional protocol.

Following observations were made in this study :

Table 1 : showing male to female ratio of the incidence of thoracoabdominal aortic aneurysm. (n=34)

Sex	No. of patients	Percentage
Male	21	61.76
Female	13	38.24
Total	34	100

It shows almost 2/3rd patients were males.

Table 2 : age wise distribution of patient population (n=34)

Age (years)	No. of patients	Percentage
0-10	0	0
11-20	02	5.88
21-30	05	14.70
31-40	16	47.05
41-50	07	20.58
51-60	04	11.76
Total	34	100

It shows highest incidence in 3rd, 4th & 5th decade of life. The mean age was 33.6 years and patients ranged from 17 to 58 years.

Table 3 : symptomatology of patients (n=34)

Symptoms	No. of patients	Percentage
Chronic backache	29	85.29
Lump in abdomen	23	67.64
Lower limb weakness	07	20.58
Acute pain in abdomen	05	14.70
Abdominal angina	01	2.94

It shows chronic backache and lump in abdomen as the commonest presenting symptoms.

Table 4 : history of preoperative risk factors (n=34)

Risk factors	No. of patients	Percentage
Smoking	28	82.35
Hypertension	9	26.47
Diabetes mellitus	6	17.64
Chronic obstructive pulmonary disease	3	8.82
Sexually transmitted disease exposure	2	10.52
Coronary artery disease	2	5.88
Peripheral vascular disease	0	0
Chronic renal failure	0	0

Smoking and hypertension are definite risk factors.

Table 5 : type of aneurysm (n=34)

Type	No. of patients	Percentage
Saccular	18	52.94
Fusiform	16	47.06
Total	34	100

Table 6 : size of aneurysm (n=34)

Size	No. of patients	Percentage
More than 10 cm	30	88.24
Less than 10 cm	4	11.76
Total	34	100

Table 7 : involvement of visceral vessels on angiography (n=34)

Artery involved	No. of patients	Percentage
Celiac artery	18	52.94
Superior mesenteric artery	14	41.17
Inferior mesenteric artery	11	32.35
Renal artery Single Both	 3 5	 8.82 14.70

Celiac and superior mesenteric artery are the vessels most commonly involved.

Table 8 : incidence of preoperative complication rate (n=34)

Complication	No. of patients	Percentage
Acute leak	3	8.82
Chronic leak	4	11.76
Distal embolism	5	14.70
Vertebral erosion	16	47.05
Paraparesis	2	5.88

Vertebral erosion was cause of backache and the most common complication seen.

Table 9 : male to female ratio amongst operated patients (n=16)

Sex	No. of patients	Percentage
Male	10	62.50
Female	6	37.50
Total	16	100

Table 10 : age wise distribution of operated patients (n=16)

Age years	No. of patients	Percentage
11-20	1	6.25
21-30	2	12.50
31-40	9	56.25
41-50	3	18.75
51-60	1	6.25
61-70	0	0
Total	16	100

Table 11 : type of aneurysm amongst operated patients (n=16)

Type	No. of patients	Percentage
Saccular	09	56.25
Fusiform	07	43.75
Total	16	100

All the aneurysms operated were more than 10 cm in size.

Table 12 : involvement of visceral vessels (n=16)

Vessel involved	No. of patients	Percentage
Celiac artery	7	43.75
Superior mesenteric artery	5	31.25
Renal artery Single Both	 2 2	 12.50 12.50

Table 13 : incidence of preoperative complications (n=16)

Complication	No. of patients	Percentage
Acute leak	3	18.75
Chronic leak	1	6.25
Vertebral erosion	12	75.00
Distal embolism	0	0
Total	16	100

Table 14 : elective and emergency procedures (n=16)

Type	No. of patients	Percentage
Elective	11	68.75
Emergency	05	31.25
Total	16	100

Table 15 : type of repair (n=16)

Type	No. of patients	Percentage
Patch aortoplasty	4	25
Graft aortoplasty	12	75
Total	16	100

Table 16 : visceral vessel implantation (n=12)

Type	No. of patients	Percentage
Included in tailored ends of graft	5	41.67
As a composite graft	3	25.0
As more than 1 cuff	3	25.0
Isolated renal artery graft with poly tetra fluroethelene	1	8.33
Total	12	100

Table 17 : distribution of patients as regards use of heparin (n=16)

Heparin	No. of patients	Percentage
Used	5	31.25
Not used	11	68.75
Total	16	100

Table 18 : distribution of patients as regards use of cold renal perfusate (n=16)

Perfusate	No. of patients	Percentage
Used	6	37.50
Not used	10	62.50
Total	16	100

Table 19 : post operative complications (n=16)

Complication	No. of patients	Percentage
Death	3	18.75
Pulmonary complications	7	43.75
Acute renal failure	4	25.00
Paraplegia	1	6.25
Hepatic dysfunction	3	18.75
Thrombo embolic phenomenon	0	0
Mesenteric embolism	1	6.25
Bleeding	2	12.50
Late pseudoaneurysm	0	0
Wound infection	3	18.75

DISCUSSION :

The incidence of abdominal aortic aneurysm is about 2 % of all sequential autopsies performed and the incidence of thoracoabdominal aneurysm is estimated to be about 2% of all abdominal aortic aneurysms[1,2].

This study reveals a relatively higher number of cases in males, it may be related to the fact that atherosclerosis is also more common in males[6]. Smoking and hypertension is also more common in males.

The disease prevalence is more in 3rd to 5th decade of life. This is in contrast to few earlier studies where the disease prevalence was more in 5th to 7th decade. This is mainly due to the fact that in the past, many of the aneurysms were syphilitic in origin presenting at a later date. The most common presenting feature in this set of patients is chronic backache and lump in abdomen. Vertebral body erosion could be responsible for the backache. Lump in abdomen is also attributed to the fact that most aneurysms are more than 10 cm in size at the time of presentation. Lower limb weakness and abdominal angina are rare presentations.

Among preoperative risk factors, smoking and hypertension was found in highest number of cases. Patients with these risk factors and having saccular aneurysms were found to land up with emergency situation. Of the 3 patients who developed post operative wound infection, all had diabetes mellitus[7].

Patients who developed acute leak were operated on emergency basis. Similarly both patients who had bleeding postoperatively, were reexplored. Cold lactated Ringer's solution at 4[9] celsius was used renal

perfusate[8]. Out of the 4 patients who developed acute renal failure, perfusate was used in 2 and not used in 2. 2 patients from each group (perfusate used and not used) died in post-operative period. The incidence of acute renal failure was 25%. An aim to decrease the period of renal occlusion may result in decreased incidence of this complication post-operatively.

Incidence of paraplegia was rare in 1 case[9,10]. Mesenteric embolism was found in patient group in which heparin was not used. Pulmonary complications requiring prolonged ventilation was required in 7 cases, all of them were smokers. On late follow up, none of the patients were found to have pseudoaneurysm formation or peripheral thromboembolic phenomenon[7].

CONCLUSION :

The thoracoabdominal aneurysm is a rare form of disease. Due to the origin of visceral vessels, there is a possibility of grave injury to the viscera. There is also need for extensive exposures of both thoracic and abdominal cavity for surgery. Repairs are now a days possible with acceptable mortality and morbidity. Renal preservation and spinal cord protection can be best achieved by keeping aortic and renal occlusion time to minimum and by reimplantation on intercostal and lumbar arteries in selected cases.

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