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STUDY OF ABDOMINAL AORTA IN LOW SOCIO ECONOMIC GROUP OF BIHAR

Anatomy

Dr. Vijay Shekhar Kumar* Tutor, Department of Anatomy, GMC, Bettiah, Bihar*Corresponding Author

Dr. Umesh Prasad Sinha Associate Prof. Department of Anatomy, GMC, Bettiah, Bihar

Dr. N.B. Singh Prof.& Head, Department of Anatomy, DMCH, Darbhanga, Bihar

ABSTRACT

BACKGROUND: The abdominal aorta frequently becomes elastic & tortuous, that changing the angle and position of bifurcation and rotating the origin of the major branches. The branches of the abdominal aorta may be divided into three sets: the visceral branches, Material and Methods: The Observation study was conduct on approximately 30 cadavers which were brought to the dissection hall of the Department of Anatomy, Darbhanga Medical College, Darbhanga, Laheriasarai, Bihar. and also on bodies brought to the forensic Medicine and Toxicology Department DMCH for post mortem examination. Conclusion: The study of abdominal aorta was conducted on 15 male and 15 female cadavers of age group varying 25-55 years from lowsocio-economic group, brought to the dissection hall, Department of Anatomy and Forensic Medicine Darbhanga Medical College, Darbhanga.

KEYWORDS

Low socio-economic, branches of abdominal aorta, pubic symphysis, umbilicus.

INTRODUCTION

The abdominal aorta frequently becomes elastic & tortuous, that changing the angle and position of bifurcation and rotating the origin of the major branches. The thoracic aorta becomes the abdominal aorta on passing behind the median arcuate ligament and between the crura of the diaphragm, and begins at the aortic hiatus of the diaphragm, anterior to the body of the twelfth thoracic vertebra (Mirjalili et al 2012a), it descends anterior to lumber vertebrae & bifurcates into two common iliac arteries anterior to 4th lumber vertebra or L4/L5 inter vertibral disc, slightly to the left of middle line (Mirjalili et al 2012b, Moussallem et al 2012).The angle of bifurcation is variable (Moussallem et al 2012). The mean adult infra renal aortic diameter measured by computed tomography is 19-21mm in men & 16-18mm in women (Rogers et al 2013), but there are ethinic variation JASPER et al 2014). Measurement by ultrasound, equivalent value are 20mm (SD 2.5mm) in men & 17mm (SD 1.5mm) in women (Needleman 2006). The mean calibre of the abdominal aorta decreases slightly from proximal to distal. With advancing age, there is progressive increase in abdominal aortic diameter in both sexes & the tapering becomes more pronounced (Fleischmann et al 2001). In the elderly, the abdominal aorta frequently becomes elastic & tortuous, that changing the angle and position of bifurcation and rotating the origin of the major branches. By its four sets of ventral, lateral, dorsal and terminal branches, it supplies the abdominal viscera of portal circulation, organs of excretory and reproductive system, skeleton and musculature of the wall of abdominal and pelvic cavities including perineum and accessory organs of reproduction, contents of abdominal and sacral portion of vertebral canal and the skeleton of vertebral canal and the skeleton and musculature of lower limb. Fifteen percent of the population displays significant variations from the typical branching pattern. The branches of the abdominal aorta may be divided into three sets: the visceral branches, which supply the organs in the abdomen, renals, testicles and ovaries; the parietal branches, which supply the diaphragm from below and the posterior abdominal walls; and the terminal branches, The abdominal aorta supplies blood to much of the abdominal cavity. It begins at T12, and usually has the following branches: The abdominal aorta lies slightly to the left of the midline of the body. It is covered, anteriorly, by the lesser omentum and stomach, behind which are the branches of the celiac artery and the celiac plexus; below these, by the lienal vein, the pancreas, the left renal vein, the inferior part of the duodenum, the mesentery, and aortic plexus. Posteriorly, it is separated from the lumbar vertebra and intervertebral fibrocartilages by the anterior longitudinal ligament and left lumbar veins.

Review of Literature

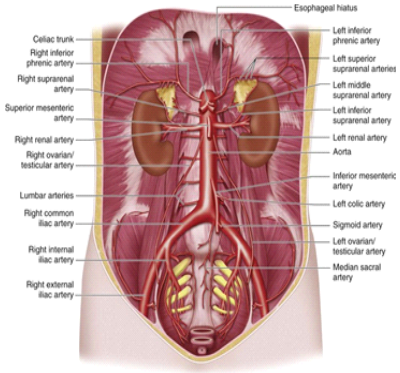
The abdominal aorta (Fig.1) begins at the aortic hiatus of the diaphragm, anterior to the body of the twelfth thoracic vertebra (Mirjalili et al 2012a), it descends anterior to lumber vertebrae & bifurcates into two common iliac arteries anterior to 4th lumber vertebra or L4/L5 inter vertibral disc. It descends slightly to the left of middle line (Mirjalili et al 2012b, Moussallem et al 2012). It diminishes rapidly in size, in consequence of the many large branches which it gives off. As it lies upon the bodies of the vertebrae, the curve which it describes is convex forward, the summit of the convexity corresponding to the third lumbar vertebra. The measurement of abdominal aorta in different individuals ranging from 16 to 70 years showed and increase with age. In males the superior and inferior extremities measured 9.8 to 14.1 mm, 8.1 to 14.6 mm. In females the luminal diameters were 9.7 to 15.7 mm and 9.1 to 14.6 mm (Alaksandrowicz et al., 1974). These values contrast with those derived from radiological observation contributed by Leithmer et al. (1975) of individuals ranging from 17-41 year, who recorded diameters of 26 mm 19 mm for the extremities of abdominal aorta. The mean adult infra renal aortic diameter measured by computed tomography is 19-21mm in men & 16-18mm in women (Rogers et al 2013), but there are ethinic variation (JASPER et al 2014). Measurement by ultrasound, equivalent value are 20mm (SD 2.5mm) in men & 17mm (SD 1.5mm) in women (Needleman 2006). The mean calibre of the abdominal aorta decreases slightly from proximal to distal. With advancing age, there is progressive increase in abdominal aortic diameter in both sexes & the tapering becomes more pronounced (Fleischmann et al 2001). The diameter of abdominal aorta diminishes rapidly in caliber from above downward because its branches are large however, the diameter of the vessel at any given height tends to increase slightly with age (Gray's Anatomy 41th Edition).

MATERIAL AND METHODS:

The Observation study was conduct on approximately 30 cadavers which were brought to the dissection hall of the Department of Anatomy, Darbhanga Medical College, Darbhanga, Laheriasarai, Bihar. and also on bodies brought to the forensic Medicine and Toxicology Department DMCH for post mortem examination. The solution was added to infusion metal beaker or flask suspended to a height. It was left so that all the solution may run into femoral artery. The body was then left for three days. On the fourth day a dilute solution of the Plaster of Paris and red lead was injected forcefully into the same femoral artery. This process was done to visualize the arteries better with red colour and hard consistency.

Observation

Thirty Cadavers were dissected for the present series of work on "Study of abdominal Aorta". The cadavers were obtained from the Department of Anatomy and Forensic Medicine, of Darbhanga Medical College, Darbhanga. The dead bodies belonged to low socio-economic group. All important observation were tabulated to achieve proper analysis and conclusion. The abbreviations used during tabulation of observation were as follow:



Abdominal Arota and its branches.

Ab	=	Abnormal
N	=	Normal
P	=	Present
A	=	Absent

Showing volume of abdominal aorta

Group	Ranges of Volume in c.c		Mean in c.c.	No.	% age
A	Largest (Above 25)	26.2 – 33.7	30.22	4	26.6
	Average (Between 20 to 25)	22.0 – 24.2	22.30	7	46.6
	Smallest (Below 20)	17.6 – 19.8	18.55	4	26.6
B	Largest (Above 25)	30.0	30.0	1	6.6
	Average (Between 20 to 25)	20.9 - 24.2	22.4	8	53.3
	Smallest (Below 20)	15.8 – 19.8	18.4	6	40.0

RESULT

A close report between the Department of Anatomy; the Dissection hall and the Department of Forensic medicine and toxicology has greatly facilitated and co-ordinated our work. The kinking of the aorta presented here is seen just above the level of the renal artery. The aortic kinking might decrease the blood flow to the kidneys and other pelvic organs and lower limbs. It might lead to pathological or true coarctation of aorta. The accessory renal arteries reported in the past, passed anterior to the ureter. The accessory artery that we are reporting passed posterior to the inferior mesenteric artery and ureter before entering the left kidney. This is notable difference in our case when compared to the previously reported cases. The artery might get compressed by the inferior mesenteric artery or the cases of hydronephrosis produced by ureteric stone consequently resulting in the vascular damage of the part of the kidney supplied by the artery. Gonadal artery variations are also well known, in a study conducted by Cicekcibasi et al, Ann. Anat. (2002 may; (3) : 275-79), gonadal arteries showed variations in 8.8% of cases. Since the right renal artery is sandwiched between the right ovarian vein & the gonadal vein, it might get compressed and lead to the malfunction of the kidney.

Evidence of disease :- Aortitis was observed in 53.3% in males and 40% in females with a ratio of 1.4: 1. Atherosclerosis was observed in 20% of males & 30.3% in females with a ratio 1.7: 1.) In male group short length varying range from 9 -10 cm with mean of 9.9 cm was measured in 6 cases constituting 40 % of cases. In females in this category the range of length was observed varying from 9 -9.5 cm. with mean of 9.3 cm in 5 cases constituting 33.3% of cases (b) Median length varying with mean value of 10.9 cm were found in 5 cases of males with 33L in females group median length was observed 10cm in 5 cases with mean value of 10cm and occurrence of 13.3% (c) Large length: in males the range observed was 11-12.5 cm. with mean value 12.47 cm in 4 cases constituting 26.6%. In females, it was observed varying from 11-12 cm with mean value of 11.2 cm in 5 cases with 33.3%. The length (large) was observed mainly in the cases of low terminations. No appropriate literature was traced with regard to aspect of our observation.

DISCUSSION

Thirty adult cadavers from low socio-economic group of Bihar were selected for the observations of abdominal aorta, out of which fifteen were of males and fifteen were of females. A close report between the Department of Anatomy; the Dissection hall and the Department of Forensic medicine and toxicology has greatly facilitated and co-ordinated our work.

Alaksandrowicz et al. (1974), Leithmer et al. (1975), Newman et al. (1971), Shah et al. (1978), Godlewski et al. (1975), Bradley et al. (1973), Drumond et al. (1914), Sierocinski et al. (1976), Sudeck et al. (1907), Harison and Barclay et al. (1948), and Braithwaite et al. (1952), had selected the age of individuals for observation of varying ranges, Lesithmer et al. (1975), had their observation on the age group between 17 to 41 years of age is close to our present series of observations. Other workers had extrems of age ranges quite away from that of ours. The accessory renal arteries are also seen frequently (Surg Radiol Anat. 2003;25;247-51.) (Surg Radiol Anat. 2001;23:33-8. (Surg Radiol Anat. 2004;26;474-9) (J. Anat. Society of India, june-2017;66-I;20-25). They enter the kidney either above or below the hilum. Their relations with the nearby structures can vary. Bilateral additional renal arteries originating from the abdominal aorta have been reported by Bayramoglu et al. (Saudi Med. J. 2003 24: 535-7). These anomalies noted by them were associated with non-rotated kidneys with extrarenal calices and pelvises. Most of the abnormalities in the renal arteries are due to the various developmental positions of kidney. (Saunders, An Imprint of Elsevier. 7th Edition. Pp. 293). Accessory renal arteries originate from the abdominal aorta either above or below the main renal artery and reach the hilum. It is important to be aware that accessory renal arteries are end arteries; therefore, if an accessory artery is ligated or damaged, the part of kidney supplied by it is likely to become ischemic. In a study conducted by Dhar and Lal (Ital J Anat Embryol. 2005;110:101-10). Accessory renal arteries were observed in 20% of the specimens. The anomaly was unilateral in 15% cases and bilateral on 5% of cases. But in indian study (J. Anat. Society of India june 2017) the accessory renal artery found in 36% (unilateral in 30% & bilatral in 6%). The total incidence of congenital anomalies of the organs of abdominal aortic supply were found 9 in males and 6 in females making the ratio 1.5 ; 1 (Table No. B 1 to B 30). Houle M.P. et al (1960), Abrens K.H. et al (1951), Papper H. et al (1957). Martinez H.S. et al (1958), Boyden E.A. (1925), Weatherite Detal (1958) and others have worked out many congenital errors of gall bladder and pancreas. Brookes VB (1954), Howell L.M. (1946), Smith R.J. (1996), M.C. Keoan T et al (1953) and others have observed variety of congenital errors of midgut. Walfer J.A. et al (1942), and Harrington S.W. et al (1951, 1955) have observed congenital errors of peritoneum and diaphragm giving rise to complications specially as floating caecum. Narrowing of aorta was observed in one case of male with 6.6% and 2 cases in female with 13.3% making the male and female ratio 1: 2. Bedford D.E. J. et al (1936), Barry A. et al (1951), Dielenga G. et al (1959), Edward J. E. et al (1948), Griwold H.E. et al (1951), Erstron 0 et al (1951), Kleinerman J. et al (1958) and others are main workers who observed the congenital anomaly of the aorta as a whole. But majority of them have their observation on thoracic part. of aorta with none that of abdominal part of aorta. Our observations on effect of congenital errors of thoracic and abdominal aorta are more near to the observations of Kleinerman J. et al (1958).

CONCLUSION

The study of abdominal aorta was conducted on 15 male and 15 female cadavers of age group varying 25-55 years from lowsocio-economic group, brought to the dissection hall, Department of Anatomy and Forensic Medicine Darbhanga Medical College, Darbhanga. Dimension of aorta was carefully measure and its length, thickness of the wall, diameter, volume and extent were observed with differences in accordance with those of the workers of other field.

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