

CADAVERIC STUDY OF DIFFERENT SHAPES OF THE HUMAN ADRENAL GLANDS

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Abstract:

Context: A descriptive study was designed to observe different shape of the human adrenal glands.

Methods: The study was done in the Department of Anatomy, Dhaka Medical College, Dhaka, from July 2008 to June 2009 and performed on 140 post mortem human adrenal glands collected from 70 unclaimed dead bodies which were in the morgue under examination in the Department of Forensic Medicine, Dhaka Medical College, Dhaka.

Results: 70% of the right adrenal glands were found pyramidal or triangular in shape. 15.7% were found quadrangular, 10% like inverted 'V' and 4.3% of oval shape. The commonest shape of the left adrenal gland was semilunar (90%). 5.7% were tetrahedral and 4.3% were triangular. **Conclusion:** The study of the shape of the adrenal gland is important for surgeons, pathologists and sonologists for proper diagnosis and treatment of adrenal diseases.

Key words: Shape, human adrenal gland, cadaver.

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Introduction:

The adrenal glands are very essential for survival, as the hormones secreted by the adrenals regulate important metabolic activities and maintains the internal milieu¹. Adrenal related clinical conditions are very common and cause hyper/hypofunction of the organ. Besides, iatrogenic removal of the adrenal gland during renal surgery leads to disturbance in hormonal functions and may be fatal². Different shapes of the human adrenal glands have been identified³. One of the important goals of the renal or adrenal surgery is recognition of normal adrenal glands. However, sometimes small adenomas, nodules, normal or diseased lymph nodes or even fat can be mistaken for localization of the adrenals. Therefore, recognition of the adrenal glands which appear in various shapes is much critical⁴. Knowledge of the shape of the adrenal glands is necessary for it. It is also important for sonologists and pathologists to differentiate the normal adrenal from any adenomatous or nodular growth, or lymph nodes whenever

investigating the diseases of the kidney, paraaortic nodes and any mass in the lumbar region⁵. Therefore, knowledge of different shapes of the adrenal gland is essential for surgeons, sonologists and pathologists for better diagnosis and management of adrenal disorders. The present study was aimed to see the variations in shape of the right and left adrenal glands and compare with the previous studies and available text references.

Methods:

A descriptive study was designed and done in the Department of Anatomy, Dhaka Medical College, Dhaka, from July 2008 to June 2009 and performed on 140 post mortem human adrenal glands collected from 70 unclaimed dead bodies which were in the morgue under examination in the Department of Forensic Medicine, Dhaka Medical College, Dhaka. All the samples were collected within 24-36 hours of death without any sign of putrefaction. All the samples were collected from medicolegal cases excluding poisoning, any cutting or

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crushing injury to the adrenal gland, gland found in one side and known case of adrenal disease.

From each cadaver the adrenal glands were collected by “Block Dissection”, using the following steps⁶:

During postmortem examination, neck, thoracic cavity and the abdominal cavity were routinely exposed by midline incision from chin to symphysis pubis. During the abdominal exploration, incision was given carefully to avoid any damage to the kidney region. Suprarenal fat along with the adrenal gland attached on the top of the kidney was mobilized carefully. The fat and the fascia were removed and the adrenal gland was detected by following the course of the suprarenal vein i.e. at right side as a tributary of the inferior vena cava and at left as a tributary of the left renal vein. Then both of the adrenal glands were cut carefully and preserved separately. The shape of the right and left adrenal glands were observed carefully (Fig.1) and noted down. All the statistical analyses were done by using the SPSS 11.0 version.

Ethical clearance: This study was approved by the Ethical Review Committee of Dhaka Medical College, Dhaka.

Results:

In the present study, 70% of the right adrenal glands were found pyramidal or triangular in shape. 15.7% were found quadrangular, 10% like inverted ‘V’ and 4.3% of oval shape (Fig.2). The



Fig.-1: Different shapes of the human adrenal gland (1. semilunar, 2. tetrahedral, 3. pyramidal, 4. oval, 5. inverted ‘V’, 6. triangular).

commonest shape of the left adrenal gland was semilunar (90%). Only 5.7% were tetrahedral and 4.3% were triangular in shape (Fig.3).

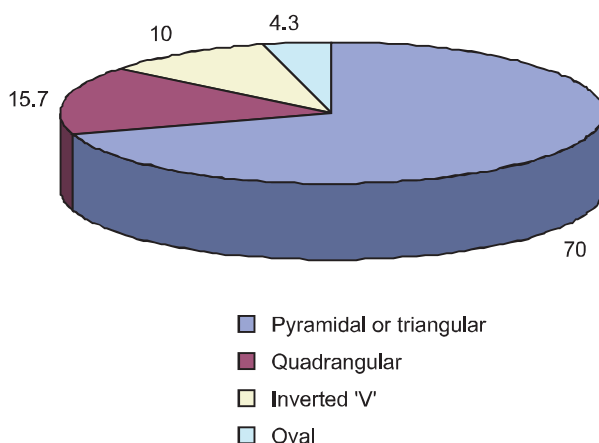


Fig.-2. Pie-chart showing the frequency of different shapes of the right adrenal gland.

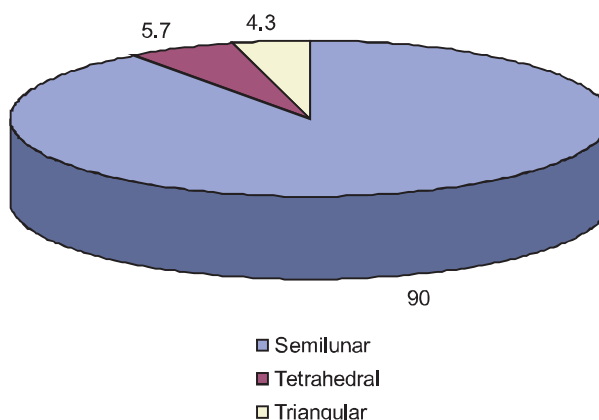


Fig. 3. Pie-chart showing the frequency of different shapes of the left adrenal gland.

Discussion:

Arey (1966)⁷ mentioned that the adrenal gland is flattened, triangular, cocked-hat shaped. Gardner, Gray and O’Rahilly (1969)⁸ stated that that the right gland is somewhat pyramidal, and the left is more flattened and semilunar in shape. Hamilton (1976)⁹ mentioned that the right gland is pyramidal in shape and the left is crescentic (half moon) in shape. According to Rogers and Jacob (1992)¹⁰, the right suprarenal gland is shaped like a cocked-hat and the left is more crescentic. Basmajian and Slonecker (1997)¹¹ stated that the right suprarenal is triangular and is ‘wedged’ between the right kidney and the inferior vena

cava (IVC). The left suprarenal is crescentic shaped. Anand et al. (1999)¹² studied on 40 adrenal glands and mentioned that the commonest shape of the suprarenal glands on left side is semilunar, but on the right side, it is highly variable: triangular, tetrahedral, inverted 'Y' or 'V' shaped. Fawcett (2004)¹³ mentioned that the adrenal glands are relatively flat, triangular organs. According to Romanes (2005)⁶, right gland is pyramidal and the left one is crescentic in shape. Borley (2005)¹ stated that the adrenal glands are morphologically slightly different in external appearance. The right gland is pyramidal in shape and has two well developed lower projections (limbs) giving a cross sectional appearance similar to a broad headed arrow. The left gland is semilunar in shape and is flattened in the anterior posterior plane. According to Ross and Pawlina (2006)¹⁴, in human, adrenal glands are pair of flattened triangular bodies. Sinnatamby (2006)¹⁵ described that the right suprarenal gland is pyramidal in shape and surmounts the upper pole of the right kidney. The left one is crescentic in shape and drapes over the medial border of the left kidney above the hilum. The results of the present study are more or less similar with the previous studies and text references.

Conclusion:

The adrenal glands are variable in their shape. Further studies with larger sample size, both peroperative and post mortem, are recommended. The results of the present study can be used as a standard reference for the shape of the adrenal glands of Bangladeshi people and to determine the abnormal evidences in Forensic and Pathologic corpses.

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References:

1. Borley NR. Suprarenal (adrenal) gland. In: Stranding S, Ellis H, Heally JC, Johnson D, Williams A, Collins P, et al. eds. Gray's anatomy: The anatomical basis of clinical practice. 39th ed. Edinburgh: Elsevier Churchill Livingstone; 2005. p.1245-9.
2. Strachen MWJ, Walker BR. eds. Endocrine disease. In: Boon NA, Colledge NR, Walker BR, Hunter JAA. eds. Davidson's principles and practice of medicine. 20th ed. London: Elsevier Churchill Livingstone; 2006. p.776-89.
3. Underwood JCE. General and systemic pathology. 4th ed. Edinburgh: Churchill Livingstone; 2004. p. 441-7.
4. Lam KY, Chan AC and Lo CY. Morphological analysis of adrenal glands; a prospective analysis. *Endocr Pathol* 2001; 12(1): 33-8.
5. Kangaroo H, Diament MJ, Gold RH, et al. Sonography of the adrenal glands in neonates and children: changes in appearances with age. *J Clin Ultrasound* 1986; 14: 43-5.
6. Romanes GJ. Cunningham's manual of practical anatomy. Vol. 3. 15th ed. New Delhi: Thomson Press (India); 2005. p.165-6.
7. Arey LB. Human histology. 2nd ed. Philadelphia: W. B. Saunders; 1966. p.179-83.
8. Gardner E, Gray J, O'Rahilly R. Anatomy: a regional study of human structure. 3rd ed. Philadelphia: W. B. Saunders; 1969. p.431-2.
9. Hamilton WJ. Textbook of human anatomy. 2nd ed. Saint Louis: CV Mosby Company; 1976. p.497-500.
10. Rogers AW, Jacob S. A textbook of anatomy. 1st ed. Edinburgh: Churchill Livingstone; 1992. p.134-6.
11. Fawcett DW. A textbook of histology. 14th ed. NewYork: Chapman & Hall; 1994. p.503-15.
12. Basmajian JV, Slonecker EC. eds. Grant's method of anatomy: a clinical problem solving approach. 11th ed. New Delhi: B. I. Waverly Pvt. Ltd.; 1997. p.180-1.
13. Anand MK, Anand C, Choudhry R, Shabharwal A. Morphology of human suprarenal gland: a parameter for comparison. *Surg Radiol Anat* 1999; 20(5): 345-9.
14. Ross MH, Pawlina W. Histology: a text and atlas with correlated cell and molecular biology. 5th ed. Baltimore: Lippincott Williams & Wilkins; 2006. p.706-15.
15. Sinnatamby CS. ed. Last's anatomy: regional and applied. 11th ed. Edinburgh: Churchill Livingstone; 2006. p.281.