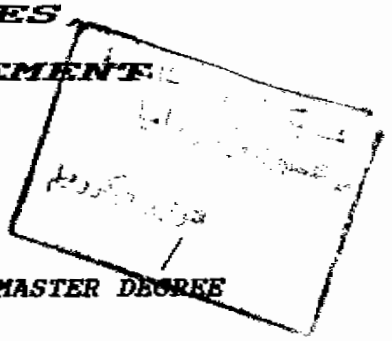
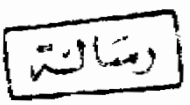
SPLENIC INJURIES,
CHOICE OF MANAGEMENT



ESSAY

SUBMITTED FOR PARTIAL FULFILMENT OF MASTER DEGREE

IN GENERAL SURGERY.



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1993

بسم الله الرحمن الرحيم

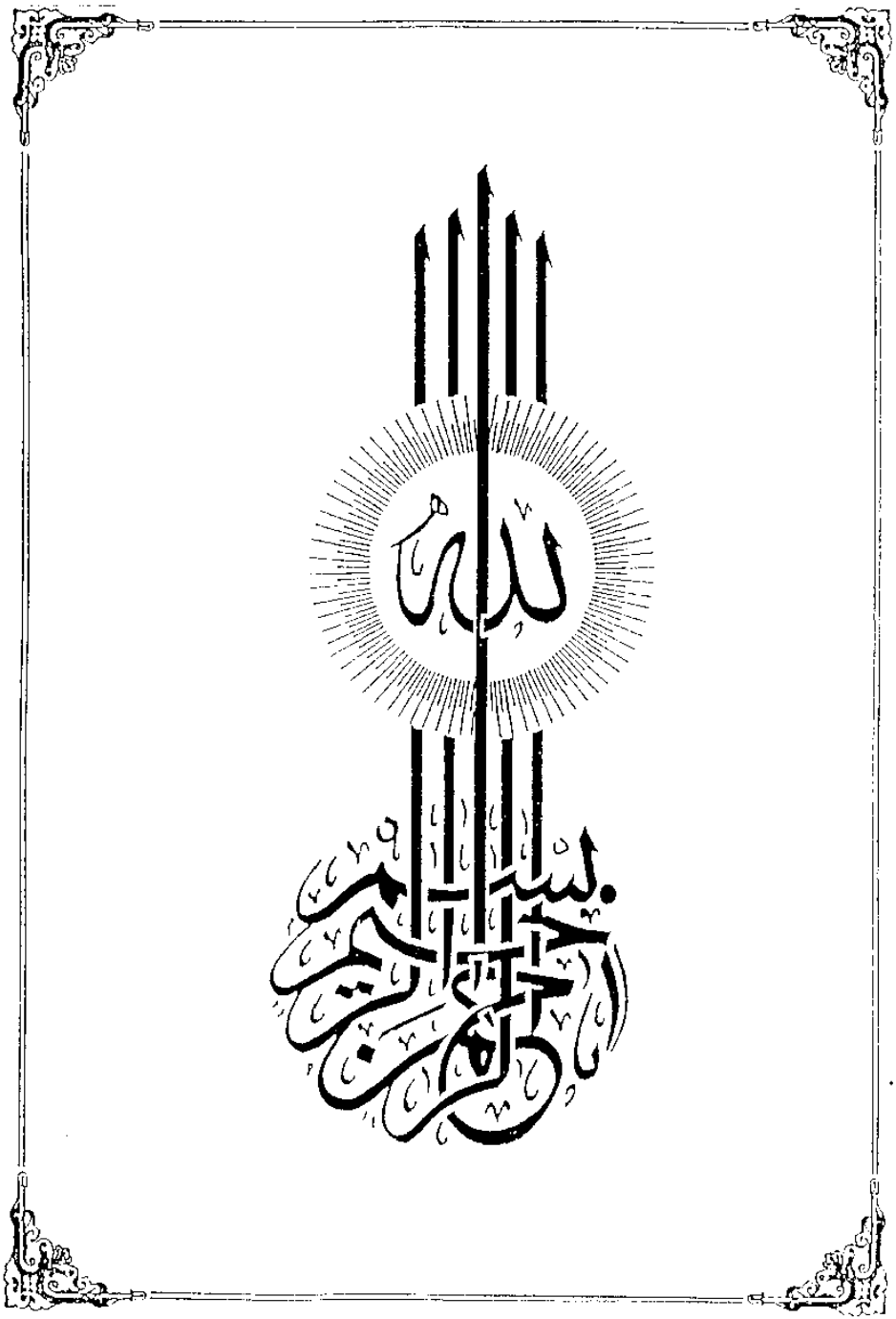
"سنريهم ايتنا فى الأفاق وفى أنفسهم

حتى يتبين لهم أنه الحق

أو لم يكف بربك أنه على كل شئ شهيد "

صدق الله العظيم

سورة فصلت آية ٥٣



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The candidate

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INTRDUCTION

INTRODUCTION

The spleen is the commonest parenchymatous organ liable for injury in cases of abdominal trauma. In spite of the recognition of the risk of postsplenectomy infection, the routine management of splenic trauma still total splenectomy.

Recently splenic salvage became the standard treatment of the splenic injury in the paediatric age group. Splenic injury in adults could also be managed conservatively.

The aim of this essay is to study the recent trends in management of splenic trauma. We shall discuss the anatomy of the splenic blood supply, the functions of the spleen, specially the immunologic functions, the overwhelming postsplenectomy infection which occurs due to loss of splenic immune surviellance over encapsulated bacteria, the methods of diagnosis and grading of splenic trauma and finally the ways of conservation of splenic tissue after trauma to the spleen either by nonoperative or operative methods.

ANATOMY AND DEVELOPMENT

transient and resident cell populations. *[Baesl and Filler, 1985]*.

The spleen originates during the 5th week of gestation from several clusters of mesenchymal cells near the tail of the pancreas these cellular aggregates later fuse to form a lobulated structure. In adults, these lobules are separated by trabeculae derived from the capsule. *[Tavassoli, 1991]*.

The cellular aggregations grow in the left side of the dorsal mesogastrium. The part of dorsal mesogastrium behind the spleen between it and the kidney, is the lienorenal ligament while the part between the greater curvature of the stomach and spleen is the gastrosplenic ligamnt. At the third month the spleen acquires its final form. *[Mahran et al., 1985]*.

The bulk of the early spleen is formed by branching net-work of connective tissue and reticular cells. At 8½ weeks of gestation, blood vessels appear as thin walled vascular loops. At 7 weeks of gestation, precursors of red blood cells can be seen.

Granulocytes and macrophages arrive in the spleen before lymphocytes appear in the spleen at 13 to 15 weeks. Throughout gestation B. cells predominate over T cells in the spleen.

At birth the spleen is larger in relation to body weight than at any other time during life, however, it is histologically immature. Few lemphoid follicles and no germinal centers are present at birth. Germinal centers begin to appear 3 weeks after birth. During the first year of life, the spleen assumes adult histologic appearance. *[Baesl and Filler, 1985].*

Anatomy :

The spleen is a soft organ,of very friable consistency, highly vascular,and of a dark purplish colour.It is situated principally in the left hypochondriac region of the abdomen, but its posterior edge extends into the epigastric region. It lies between the fundus of the stomach and the diaphragm. In the adult it is usually about 12 cm in length, 7cm in breadth and 3 to 4cm in thickness, but it tends to diminish in size and weight with advancing age. Its average weight is 150gm ranging from 50 to 300gm. *[Warwick R., Williams P.L., 1973].*

The topographical anatomy of the spleen is adequately described elsewhere in anatomy textbooks.

Accessory Spleens

These are small encapsulated nodules of splenic tissue may be found frerquently in the neighbourhood of the spleen or may be very numerous and widely scattered in the abdomen. Most common sites are the splenic hilum and tail of the pancreas. *[Baesl, Filler, 1985]*.

Blood Supply Of The Spleen :

The splenic Artery arises from the coeliac artery at the upper border of the pancreas and passes to the left. It is very tortuous, the crests of its waves appear above the pancreas, the troughs lie hidden behind its upper border. The artery runs behind the peritoneum and passes with its vein and the tail of the pancreas, across the left crus and left psoas muscle to the hilum of the left kidney where it turns forward in the lieno renal ligament to the hilum of the spleen, Here it breaks up into four or five short branches that radiate as they sink into the splenic substance. The splenic artery is the main source of blood supply to the pancreas. Just before the artery breaks up into its terminal splenic branches it gives off the left gastroepiploic artery and the vasa brevia to the greater curve and fundus of the stomach respectively. [Last R.J. 1984].

The Splenic Vein begins in the hilum of the spleen by confluence of half a dozen tributaries from that organ. Having received the vasa brevia and the left gastroepiploic vein it passes with the tail of the pancreas, below the splenic artery, through the lienorenal ligament to lie over the hilum of the left kidney. It is a large straight vein which passes to the right in contact with the posterior surface of the pancreas. It lies in front of the left renal vein along its upper border. In front of the inferior vena cava it joins the vertical trunk of superior mesenteric and portal veins at right angle. It receives many tributaries from the pancreas. As it lies infront of the left crus of diaphragm it receives the inferior mesentric vein. *[Last R.J., 1984]*.

Segmental Distribution Of Blood Supply Of The Spleen :

Kyber [1870] described the spleen in man, cat, dog, horse and rabbit as being divided into several segments by 'Fibrous Septa'. He stated that each segment was supplied by its own artery. *Tait & Cashin (1925)* confirmed the presence of segments in the spleen of the dog and cat and showed that stimulation of individual neurovascular bundles in the dog spleen produced localized contraction of a segment. However, *Dreyer & Budtz- Olson (1952)* are commonly regarded as being the first workers to describe the human spleen as consisting of separate venous segments. They discovered this while

carrying out diagnostic splenic venography *[Gupta et al., 1976]*.

Braithwaite & Adams (1956) stated that each splenic segment had an independent arterial supply and venous drainage after injecting radio-opaque media into them. *Clausen (1958)* and *Gutierrez (1969)* demonstrated splenic segments in corrosion casts of the splenic artery and its branches.

Gupta et al.,[1976] likewise, by corrosion casts study, demonstrated the presence of two segments - a superior and an inferior - in 84% of specimens studied on the basis of primary arterial branching and three segments in 16% of specimens [Supperior, middle and inferior]. They were separated by an avascular plane or planes lying perpendicular to the loug axis of the spleen. *[Gupta et al.,1976]*.

Mikhail et al., [1979] studied the parenchymal distribution of the splenic artery by making corroision casts.

They noticed that in 77% of cases the splenic artery divided into superior and inferior terminal branches. In the remaining cases [23%] superior, middle and inferior terminal branches were identified. In 12% of the spleens there was

both an upper polar and a lower polar branch; another 12% presented with an upper polar, 50% with a lower polar, and the remaining 26% with terminal branches only. Avascular planes coinciding with deep notches on the external surface separated the territories supplied by these terminal branches of the splenic artery and so such planes could be used in dividing the spleen into lobes. Accordingly, the splenic lobes could be from two to five in number. No signs of commuinication could be traced between any of the segmental arteries or their subsequent branches ***[Mikhail et al., 1979]***.

Redmond et al., [1989] most recently carried out a study on human spleens using anatomical dissection and a sequential injection method involving both radiology and corrosion casting. The investigators suggested the use of specific nomenclature as follows would facilitate the identification of splenic vasculature. ***[See Fig., 1]***.

Common Splenic Artery :

The splenic artery, henceforth referred to as the 'common splenic artery ', arises as a single trunk from the coeliac axis in all cases except very rarely where a second spelnic artery arises directly from the aorta. The common splenic artery divides into a 'superior' and 'inferior' splenic artery in all cases .

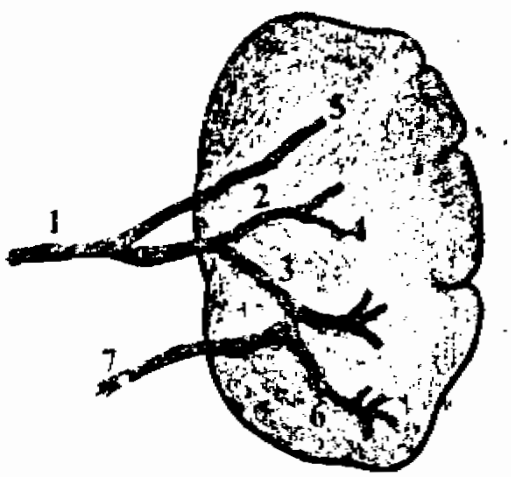

Figure 1 :

Diagram showing suggested splenic nomenclature.
1. Common splenic artery.
2. Supeior splenic artery;
3. Inferior splenic artery;
4. Central segmental artery;
5. Superior polar artery;
6. Inferior polar artery;
7. Left gastro-epiploic artery. *[Redmond et al., 1989]*