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SYSTEMATIC REVIEW OF THE CONCEPT OF VRIKKOUTOTPATTI (EMBRYOLOGY OF KIDNEY)

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ABSTRACT

Science is the outcome of human curiosity, which has led people to study, evaluate, and determine the outcomes of numerous natural bodily processes. Today, the reality of everything has been demonstrated both practically and scientifically Ayurveda, being a part of this science also needs a deep study and research for proving all the facts established by Acharyas in ancient science. Vrikka is formed by Prasad bhag of Rakta and Meda. The urinary system's main purpose is to maintain homeostasis in the body by regulating blood volume and composition. Vrikka is comparable to the kidney in modern science. The kidneys, or Vrikka, control how wastes from the blood are eliminated by urine. Vrikka is regarded as the Mools thana of the Medovaha Srotas. Due of Shonita and Meda's disequilibrium as they form from it, Vrikkaroga may be feasible.

KEYWORD: Kidney, Mutra, Renal disease, Rakta, Meda,Vrikka, Vrikkaroga.

INTRODUCTION

The world's oldest fully functional medicinal system is Ayurveda. Thus, the Vedas, the holy books of knowledge, continue to be the primary sources of knowledge in the discipline of Ayurveda. According to Aacharya Sushruta, when a character moves normally within the body, Vayu keeps Dosa, Dhatu, and Agni in balance and starts their respective activities.

Sharir Rachna is segmentation of Ayurveda which exclusively deals with the study of human body through dissection which forms the suitable essential basics and set a strong base for further medical knowledge. Vrikka or Vrukka are the derived of the root "वृक्कादाने" meaning

to take Sushruta has clearly mention about the vrukka. He also mentioned that are made out of the essence of blood and fat related to Medovwah Srotas. Anatomical situation of Vrukka described by Acharya Charak by among in 15 kosthang. According to Acharya Charak kosthang having hallow space organs having formation and purification soluble, insoluble dietantric with help up their own secreations. Hence including all kosthangs vrikka is most important organs upward body for formation excretion of urine as well as purification of blood.

He also mentions that vrukkas are the root of fat carrying duct. According to Ashathang samgraha, kashap samahita and in bhel samahita vrukka is a kosthang.

AIM AND OBJECTIVES

1. Analysis of the Vrukka concept.
2. Vrukka's Upayojita Sharir.
3. Ayurvedic Vrukka and contemporary kidney concepts are related**.**

MATERIALS AND METHODS

Different Ayurveda Classical textbooks Charaka Samhita with Sanskrit Commentary of Chakrapani and Hindi Commentary of different Ayurveda scholar, Sushruta Samhita with Sanskrit commentary of Dalhana and Hindi commentary of different Ayurveda scholars like Prof. Ambika Datta Shastri Kashyapa Samhita, Hindi and English commentary, different Ayurveda journal articles, different textbooks of embryology (Prof. IB Singh, Vishram Singh, Langman's embryology etc.), different textbooks of anatomy.

REVIEW OF LITERATURE

Nirukti

"वर्षति इति वृक्क"(अमरकोष).

The word derived from the word "वृष सेचने" which means Irrigation. "बुक" word is also used for vrukka (अमरकोष).

Utapatti

"रक्त मेदः प्रसादात वृक्कों" (सु० शा० ४ / ३०)

- According to Sushruta development of vrukka occurs from parasad bhag of Rakta and Meda.
- Charak has counted vrukka under Matraja Bhava.

Modern Point of View

- Secretory Part- Nephrogenic cord(Metanephron).
- Metenphron forms-Metanephricblastema.
- Collecting part-Uretic bud arise from the lowerpart of Meshonephric duct.
- Nutrition-Dorsal Aorta

The development of the urinary tract begins with the formation of the nephrogenic cord in week four, along which the pronephros, mesonephros and metanephros form. Although the metanephric kidneys act as functional excretory units as early as week eleven, nephrogenesis is not complete until week thirty-two when multiple branching events have formed one to three million collecting tubules. Complex orchestrated interactions between various embryonic tissues, the mesonephric duct, ureteric bud, and metanephric blastema ensure the correct development of the urinary tract. Disruptions to these intricate signaling pathways, either genetic or environmental, result in congenital abnormalities of the kidney and urinary tract (CAKUT) including renal agenesis and dysplasia, multicystic dysplastic kidney disease and polycystic kidney disease.

Kidney Development

Embryonic folding during the fourth week of development marks the beginning of the urinary tract with the formation of a longitudinal mass known as the urogenital ridge. The ridge can divide into parts depending on the system it forms; the nephrogenic cord will form the urinary tract while the gonadal ridge will develop into the reproductive system. Beginning rostrally and progressing caudally, three kidneys will form over a few weeks within the nephrogenic cord: pronephros, mesonephros, and metanephros.

Pronephros development begins in the fourth week; however, they will not form functioning kidneys in humans. Pronephric ducts develop in the cervical region of the nephrogenic cord before extending and fusing with the cloaca. Adjacent to the pronephric ducts, the

intermediate mesoderm will condense to form non-functional nephron units, known as pronephroi, which will regress by day 25.

The mesonephric duct, also known as the Wolffian duct, now begins development in the next most caudal region of the nephrogenic cord. Similarly, the adjacent intermediate mesoderm condenses to form mesonephroi. Although approximately 40 pairs of mesonephroi form, only those located between L1-L3 continue to differentiate to form functional excretory units. Thus, approximately twenty nephrons form capable of excreting small amounts of fluid into the amnion between the sixth and tenth week of development. Similar to the pronephric duct, the mesonephros and mesonephric duct will later degenerate in females; however, in males, these embryonic structures persist and develop into the epididymis, vas deferens, seminal vesicles, and the ejaculatory duct.

The third and final kidney, the metanephric kidney, begins development during the fifth week and will continue to differentiate to form the permanent kidneys. The mesonephric duct extends to fuse with the cloaca, thus inducing the sacral intermediate mesoderm to form an aggregate known as the metanephric blastema. At the beginning of week five, the metanephric blastema secretes a protein known as glial-cell derived neurotropic Factor (Gdnf), thus inducing an outgrowth in the mesonephric duct known as the ureteric bud; Gdnf acts as a ligand for cell surface receptor RET and on its co-receptor, Gdnf Family Receptor alpha 1 (Gfr-alpha1) which are both strongly expressed in the mesonephric duct.

During the sixth week of development, the ureteric bud begins a branching cascade which will subsequently create collecting tubules and the basic renal architecture. The first bifurcation occurs during the sixth week and forms the renal pelvis as well as the cranial and caudal lobes of the kidney. The next four bifurcations coalesce to form the major calyces, while the following four bifurcations coalesce in the seventh-week form the minor calyces. Branching gets induced by Gdnf acting on the RET expressing cells in the tips of the ureteric bud; each individual branch acquires a blastemal cap from which Gdnf gets secreted. This cascade continues until week 32, thus producing approximately 1 million to 3 million collecting tubules.

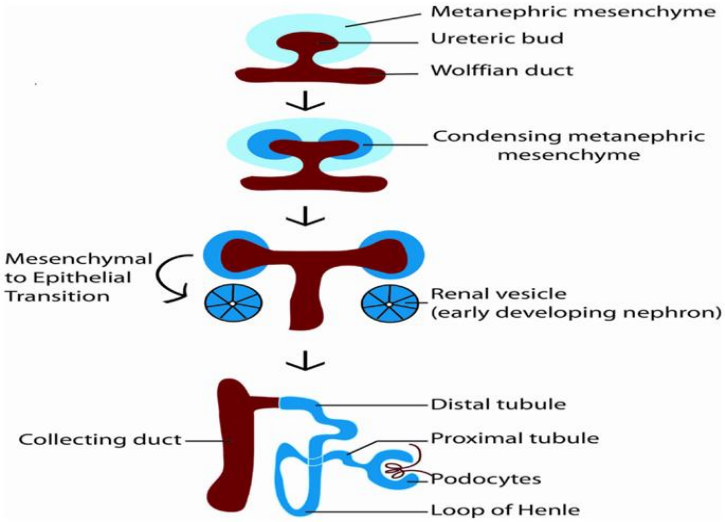

Fig. 1.

Functional nephrons begin to develop when the tip of each collecting tubule induces the blastemal caps to form nephric vesicles. These will then develop into nephric tubules consisting of an S-shaped Bowman's capsule, proximal and distal tubules, and the loop of Henle. Development of glomerulus begins when podocyte precursors lining the S-shaped body secrete VEGF2, thus attracting endothelial cells and generating a primitive vascular tuft. This activity will form the afferent and efferent arterioles of the glomerulus. Contact between the podocyte precursors and the endothelial cells stimulate differentiation of podocytes, with the glomerular basement membrane forming at the boundary between the two. The distal end of the nephric tubule, the distal convoluted tubule, fuses with the collecting duct to form a uriniferous tubule.

During early development, the kidneys lie close together in the sacral region of the embryo. However, as the abdomen enlarges, the kidneys are drawn apart and ascend to their final position in the lumbar region between weeks six to nine. The kidneys receive vascular supply from branches of the dorsal aorta called renal arteries; during their ascent, the caudal branches degenerate, and the kidneys receive their blood from successively higher branches.

Situations

"वृक्को मास पिंण्ड द्वयम् एको वामपापार्श्व स्थितः ।

द्वितीयो दक्षिण पार्श्व स्थितः" (डल्हण सु० नि०४/३०)

According to commentar Dalhana Vrukka look like Maspindwat in 2 numbers. 1st one is situated in left lateral quadrum and 2nd one is in right lateral quardrum. Kidney is a

retroperitoneal organ. situated on the posterior abdominal wall in each side of the vertebral coloumn between T12 to L3 vertebrae.

Shape

"वृक्कौ कुक्षि गोलको"

Modern point of view - Bean shape

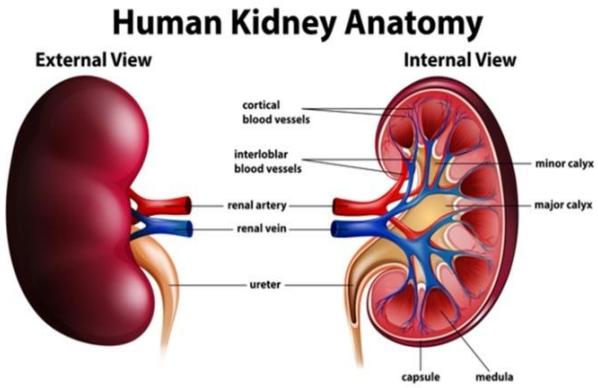

Fig. 2: Human Kidney Anatomy.

Relation Srotas

According to Acharya Sushruta and Acharya Charak both they have consider Vrikka as a originate of medovah Srotas.

मेदवहे दवे तयोर्मूलं कटी वृक्कों च (सु० शा ० ९ /)

मेदोवहानां स्त्रोतसां वृक्कों मूलं वपावहनं च (च० वि० ५/८)

Functions

"वृक्क पुष्टिकरौ प्रक्तौ जठरस्थस्य मेदसः" (शा० स०५/८४)

Due to this particularly nourishment of Meda dhatu or completed as such adipose tissue formation.

In routine life formation and excretion of urine depend on daily water intake capacity, if water intake is less than 1 Ltr/day, its means toxicity remains under in body that makes Medodhatu dusti and generate Medorog.

According To Modern Point of View

- Maintaining overall fluid balance.

- Regulating and filtering minerals from blood.
- Filtering waste materials from food, medications and toxic substances.
- Creating hormones that help produce red blood cells, promote bone health and regulate blood pressure

Uppayojit Sharir of Vrukka

- "पुटि" Cyst
- "विद्रधि" Abcess
- "वृक्काश्मरी Renal Calculus

DISCUSSION

On The Basis of Rachana

- According to Sushruta, the parasad bhag of Rakta and Meda leads to the development of the Vrukka.
- Nephrogenic cord: Secretory part (Metanephron).
- Metanephric blaste, or the retroperitoneal organ, is a type of metanephron that has two nodules that are round, bean-shaped, tilkalak,
- And reddish brown in colour.
- Situated on posterior abdominal wall.
- Situated at the level of vertebrae T-12 AND L-3.
- The first one is located in the left lateral quadrum, and the second one is in the right lateral quadrum.

On The Basis of Kriya Sharir

The phenomenon of urine formation is included in Ayurveda physiology from the beginning of food digestion and absorption, especially absorption of water (the urine's precursor) from the colon, continual microfiltration of the urine from blood through the nephrons known as Mutravaha Srotas, collection of the urine in the bladder known as Mutravahi dwe, or the two ureters, and micturition through the urethra.

On The Basis Of Pathology and Disfunctioning In Ayurveda

The various clinical entities mentioned in Ayurveda's several categories, such as uropatheis, urolithiasis, oligoureas, and anureas, are obtained below with closest contemporary relationships that show a strong clinical link.

These are the tabular channels of the kidney, which have a globular form resembling a clay pot at their most distal end. The "Nisyandana" or filtration process occurs here in a manner reminiscent of the clay pot mechanism described in Ayurveda.

According to a review of Brihatraye literature, the placement and outward look of the Vrukka perfectly fit the kidney.

Mutrasada: Oliguric Renal Failure

Mutra Kshaya: Renal failure due to anuria.

Points	**Ayurvedic view**	**Modern view**
Utapatti	Matraj bhav Drived from the Rakta and Med	Secretory-Nephrogmnic cord Collecting part- Uretic bud
Sankhya	2	2
Situation	Vaam and daksin vaam parshsawa	Lumber region, At the level of T12-L3
Relation with Srotas	Medovaha	Fat
Shape	Kuchhistha Golko	Bean
Upayojit Sharir	Puti	Renal Cyst
	Ashmari	Renal Calculus
	Vidradhi	Renal Abscess
	Vrukka arbudh	Renal Tumour
	Vrukkashoth	Nephritis

CONCLUSION

The results of the overall study of the Vrukka point to the fact that the Vrukka is primarily taken into account in the Medovaha Srotas since it mostly contributes to the accumulation of fat. It is essentially mentioned in Medovaha Srotas, but modern science finds it to be more appropriate and similar to the urinary system. For example, it is bean-shaped, which is similar to the pelvic cavity, and it is located in the pelvic cavity.

Urine and fat production (पुष्टिकरौ प्रक्तौ जठरस्थस्य मेदसः)

- The vrukka and kidney are morphologically the same organs, although they serve different purposes in terms of function.
- It mostly contributes to the production of urine and its discharge.
- According to its applied/Uppayojita Sharir, many diseases, including renal stones, arise in the kidneys. Nephritis is just one example. These all interfered with the urinary system, therefore it is necessary to state that, physically, Vrukka is more relevant to the kidney, but that, functionally, it defines the Ayurvedic concept.

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