

existence of hæmorrhage from the kidney or the urinary passages. It may result from

*A. Disease of the Kidney.*

Acute Bright's Disease.

Congestion of Kidney.

Cancer of Kidney.

External Injury.

Tubercle (*very rare.*)

*B. Disease of Pelvis and Ureter.*

Calculus in Pelvis and Ureter.

Parasite, as *Bilharzia hæmotobia*.

Cancer.

Tubercle (*very rare.*)

*C. Disease of the Bladder.*

Calculus.

Cancerous or Villous Growths.

Congestion of Mucous Membrane.

*D. Disease of Urethra.*

Congestion, as in Gonorrhœa.

Tearing of the Mucous Membrane from Mechanical Injury.

*E. Constitutional.*

Purpura and Scurvy.

Hæmorrhaphilia.

The Acute Specific Diseases, (*rarely, in malignant cases.*)

*F. In female, Uterine Discharges, as menstruation, &c.*

As a general rule, if the blood be completely mixed with the urine, the hæmorrhage is from the kidneys; if the urine first passed be clear, and that at the end of micturition become bloody, or if even pure blood be passed, the hæmorrhage is from the bladder or prostate; while if the first portion of the urine be bloody, and the last drops clear, the hæmorrhage is from the urethra.

MUCUS AND EPITHELIUM.

Mucus is a constant constituent of every urine, and if healthy urine be allowed to remain at rest for an hour, a light cloud will be found to have settled at the bottom of the urine glass; on microscopical examination, it will be found to consist of mucous corpuscles, and epithelium scales detached from the surfaces over the urine has passed.

The Urethra and bladder give up a roundish or oval epithelium cell to the urine. In the urine of the female, especially in cases of leucorrhœa, the epithelium cells of the vagina are very numerous, and they exactly resemble the squamous epithelium of the mouth. Under irritation, the mucous membrane of the pelvis and ureter will produce cells, caudate, spindle-shaped, and irregular, exactly similar to those formerly regarded as diagnostic of cancer. From this circumstance it is impossible to speak positively of the existence of cancer cells in the urine.

Desquamation of the tubular epithelium of the kidney occurs only in disease; the cells, as seen in the urine, are slightly swollen, and acquire a more

spheroidal, and less distinctly polygonal, shape, apparently from the imbibition of fluid, and the removal of pressure. The cells are frequently granular, and contain fat drops, or are contracted, withered up, and shrivelled.

*Clinical Import.* See Section on Renal Casts.

RENAL CASTS.

In Bright's disease, and in congestion of the kidney, there are formed in the uriniferous tubules, lengthened cylinders which are discharged with the urine, and form the deposit known as "casts." Those found in the urine are probably chiefly formed in the straight uriniferous tubes; and the view of their origin which has found most favour in this country, is that the casts are formed by the escape of blood into the tubes of the kidney, and coagulation of the fibrin, which thus becomes moulded to the shape of the tube into which it has been extravasated. It is probable that many of the hyaline casts are formed in this way; but the balance of evidence at the present day is in favour of the epithelial and granular casts being produced by a desquamation and degeneration of the renal epithelium.

When the urine contains casts in great quantity, they can scarcely be overlooked, if the urine be allowed to settle for a few hours in a tall cylindrical glass, the whole of the supernatant fluid poured off, and the last drops which flow from the lip of the glass put under the microscope and examined. If there are but a few casts present, other plans may be adopted; the urine may be acidulated with a little acetic acid, and thus the uric acid precipitated, with which the casts will be carried down as well; or the urine may be filtered, and the casts searched for on the filter paper; or if the specific gravity be high, the urine may be diluted with distilled water, set aside for an hour, and the deposit then examined. With a little experience, the student will soon become familiar with the appearance of casts, and will at once be able to distinguish them from foreign bodies in the urine. They are never broader than 6, or less than 2, red blood corpuscles in diameter; but they vary considerably in length, never, however, exceeding the  $\frac{1}{50}$ th of an inch. The same cast does not vary greatly in its diameter, and never becomes twisted on itself, as a cotton fibre does.

The foreign bodies, most liable to be mistaken for renal casts, are cotton fibres, hair, and pieces of deal.

*Cotton fibres* have a very irregular outline, and are much broader at one part than at another; they are often twisted, and of great length, which will distinguish them from casts. Their structure is often striped in a longitudinal direction.

*Hair* can often be distinguished from renal casts by its colour alone; and if this be not very apparent, by its possessing a cortical and medullary structure; and by its length being greater than that of any cast.

*Fibres of Deal*, which have their origin in the furniture, &c., of the apartment, may perhaps be mistaken for renal casts. They are at once recognised