

The Kidney in Diabetics: Other than Nephropathy

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The kidney is thoroughly studied in diabetics since it is one of the target organs for major complication caused by diabetes. Diabetes is a major cause of end-stage renal failure worldwide. Clinicians and statisticians have highlighted the danger of this epidemic.

In this paper, kidney complications in diabetics other than diabetic nephropathy will be addressed and discussed. Certain epidemiological, pathophysiological issues and recommendations for screening will be highlighted.

Why this topic?

Suspicion of diabetic nephropathy is based on clinical clues like proteinuria (with its different degrees), clinical retinopathy and disease duration. Confirmation of the diagnosis, however, needs kidney biopsy. The recommendation of kidney biopsy use in diabetic nephropathy diagnosis is under great debate, since it is most common cause of kidney derangement¹.

Based on the above argument and following certain criteria, most physicians treat any proteinuria in diabetics as diabetic nephropathy. This does not explain the whole picture of kidney derangement in diabetics. However; thorough evaluation of different causes of proteinuria is needed to achieve better management of renal impairment.

The high prevalence of asymptomatic bacteruria and sterile pyuria in diabetics, especially type 1, mandated a search in the family physician corner.

The ultimate goal of any internist, family physician or diabetologist is to obtain a better glucose control. Investigating kidney impairment in diabetics will help achieve this goal.

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What are the other causes of kidney impairment in diabetics?

The following are prevalent kidney pathologies in diabetics other than the diabetic nephropathy^{2,3}.

1. Primary glomerulonephritis.
2. Renal papillary necrosis.
3. Contrast-induced Renal failure
4. Kidney Infections.

Primary Glomerulonephritis

Many types of glomerulonephritis are prevalent in diabetics, including IgA nephropathy, membranous nephropathy, mesangiocapillary glomerulonephritis and minimal change disease. More than one type may coexist superimposing on diabetic nephropathy².

IgA nephropathy is the most common in type 2 diabetics. This may be due to its widespread in the general population as well².

Epidemiologically, IgA glomerulonephritis is common in both types of diabetes than the general population. Pathologically, diabetes affects the glomerular structure and causes non-enzymatic glycation of immunoglobulins. This may explain the prevalence of the immunopathological process of IgA nephropathy^{2,3}.

Renal Papillary Necrosis (RPN)

Impaired blood flow to the inner medulla and papilla of the kidney can lead to anoxic damage and ultimately to renal papillary necrosis. Sloughing of the renal papilla may ensue, which can obstruct the renal pelvis. Patients may remain asymptomatic or develop flank pain and renal colic. RPN can be caused by analgesic abuse and often occurs in sickle cell disease, or ureteral obstruction⁴.

The prevalence of renal papillary necrosis at autopsy is 20-30 times more in patients with diabetes than in those without⁴.

Groop et al found that 23.7% of diabetics had RPN most of them were women. Among diabetic patients, RPN occurs bilaterally in half of the cases and is 2.5 times as frequent in women as in men⁴.

Contrast-induced renal failure

This entity is more common in persons with diabetes than in those without. Some reports suggest that diabetic patients with normal kidney function are not at greater risk of contrast-induced nephropathy than non diabetic; more recent data indicate they are. Type 1 diabetics may be at greater risk than those with Type 2⁵.

Kidney Infections

The Urinary tract is the most common site of infection in diabetics. All spectrum of urinary tract infection is common in diabetics. The reported prevalence of histologic pyelonephritis is 10%-20% in persons with diabetes. This is five times more than that in non-diabetic persons⁶.

Not only the frequency of urinary tract infection greater in diabetic patients, but also the infection is often more serious and protracted⁶.

Urinary Tract Infection (UTI) is more common in diabetic females. Diabetic women have about three times the frequency of bacteriuria as non-diabetic women, but in diabetic men, most studies shows lower prevalence. Pregnant diabetics have 2-4 fold increase in bacteriuria⁷.

The prevalence of asymptomatic bacteriuria is not influenced by the type or duration of diabetes or by the level of glycemic control⁷.

The mode of entry of the causative organisms is usually the ascent of bacteria from the urethra to the bladder and to the kidney. Gram negative bacilli from bowel may colonize at the introitus, and the periurethra⁸.

The presence of diabetes predisposes to more severe infections, especially with poor control and the presence of complications⁸.

Factors favoring UTI in Diabetics⁸

1-Immunologic

Impaired neutrophil and Monocyte functions (Chemotaxis, phagocytosis, Adherence).

Decreased level of complements and helper T cells is another factor favoring increased infections in diabetics.

2-Neuropathic

The neuropathic effect of diabetes decreases the urinary bladder tone which renders this organ a favorite site for pathologic organisms to multiply and hence for the increased rate of infections.

3-Vascular

Diabetes is an ischaemic disease and the consequences thereafter of ischemia favor the multiplication of organisms.

Glycosuria itself is a factor in increasing the preponderance of diabetics to develop frequent, protracted and serious UTIs.

Infections role in Diabetes Control

It is known that any infection leads to increased production of counter regulatory hormones. These hormones act in turn to derange the action of insulin and increase the resistance of insulin on the peripheral level. They cause inhibition of insulin secretion⁹.

Infection itself causes insulin inhibition and increases the peripheral resistance to insulin⁹.

What are the most common organisms affecting the urinary tract in diabetics?

Lye et al found that E.coli was the most common agent in community-acquired UTI in diabetics⁹.

The percentage of Klebsiella species causing community-acquired UTI in diabetic patients was significantly higher than in non-diabetics¹⁰.

Complications of UTI in People with Diabetes

Women with diabetes have frequent and severe UTI. They are also more frequently hospitalized⁹.

Most serious, but rare, complications of UTI (pyelonephritis, widespread infections, abscesses, inflammation of the bladder wall) occur mostly in diabetics⁹.

The role of insulin in UTI

Insulin and glucose affects the growth and some of the surface characteristic of E. coli in the urinary bladder. Insulin acts as a growth inhibitor factor to the offending organisms. That is why patients with type-2 diabetes not on insulin and females with gestational diabetes have more frequent attacks of UTI with protracted courses than diabetics on Insulin¹¹.

What are the recommendations for the screening of UTI in diabetics?

The American Academy of Family Physician has recommended the regular screening for UTI in high risk patients including diabetics. It did not specify how frequently this should be done or what the preferred screening method is¹².

On the other hand, the United States Preventive Service Task Force (USPSTF) states that there is an insufficient evidence to recommend for or against routine screening for asymptomatic bacteriuria in diabetic or ambulatory elderly women, but recommendations against such screening may be made on other grounds¹².

CONCLUSION

In summary kidney involvement in diabetics is not one mere entity but rather a very complicated and interrelated one. In order to achieve a better control of blood sugar and other complications a thorough examination of the kidney should be done putting in mind other intruders to the kidneys.

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