Case Report

Diabetic Cystopathy In A Type 2 DM Patient

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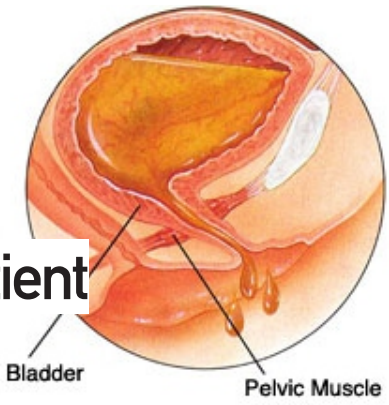

ABSTRACT

Diabetic cystopathy is a well -recognized but often overlooked complication of diabetes mellitus which usually develops in middle age or at least ten years after the onset of hyperglycemia. In this case report, we present a 48 year old man, diagnosed diabetic ten years before, who presented with painless abdominal swelling and incomplete bladder emptying of a month duration. Random blood glucose at presentation was 30mmol/l. He was managed as a case uncontrolled type 2 Diabetes mellitus with multiple chronic complications amongst which was diabetic cystopathy which prompted him to seek medical intervention.

Glycaemic control was achieved with the use of insulin. Initial retention was relieved by passage of a urethral catheter and subsequently timed voiding was emphasized. Good glycaemic control was associated with a significant improvement in symptoms.

CASE REPORT

Mr SI is a forty eight year old motorcyclist who was referred to the Endocrinology clinic of Wesley Guild Hospital(WGH) Ilesa from the General Outpatient Department (GOPD) of the same hospital. He is a known diabetic diagnosed about ten years prior to presentation but wasn't on any medication or treatment . He presented with a month history of intermittent painless lower abdominal swelling which reduces after urinating with associated incomplete bladder emptying.

Swelling was insidious in onset, with an inferior-superior progressive increase in size. Swelling is not painful and reduces with micturition but subsequently returns after a few hours. There is associated hesitancy and decreased frequency of voiding which progressed to complete inability to void. There is no history of straining, dysuria or urgency. There is a previous history of polyuria, polydipsia and polyphagia. There is history of progressive weight loss and anorexia. There is no history of any form of trauma to the abdomen or back. There is no history of fever. There is no history of previous urethral discharge.

He has blurring of vision, poor vision, and abnormal sensations worse in his hands and feet which he described as "pinprick". There is a history of erectile dysfunction. He has also noticed skin changes on his legs. He has noticed frothiness of his urine with intermittent pedal oedema but doesn't remember any history of facial swelling. He has no history suggestive of either gastropathy or gustatory sweating. There is no history of previous loss of consciousness. There is no history of chest pain or palpitations. There is no history of intermittent claudication.

At the GOPD, his random blood glucose was found 30 mmol/L. A urethral catheter was passed to drain the urine and he was commenced on Oral Hypoglycemic Agents,(Metformin 500 mg B.D and Glibenclamide 2 mg B.D) and Ciprofloxacin 500mg B.D, he was then referred to the Endocrinology clinic.

He was diagnosed diabetic about ten years ago following a febrile illness. He hasn't been on any medication after the initial diagnosis because he believed he had been cured. There is a history of use of herbal concoction. There is no known family history of Diabetes mellitus. He is not a known hypertensive. He is married in a monogamous setting to a 36 year old tailor and they have 7 children. No history of Alcohol consumption or smoking was obtained.

Examination revealed a chronically ill –looking man with a 1×1 cm tender carbuncle at the inferior part of the Right malar region. There was a suprapubic swelling about 14×12 cm, not tender, immobile and stony dull to percussion. Digital rectal examination showed no signs of prostatic enlargement.

Nervous system examination revealed impaired joint position sense in both feet and loss of light touch sensation over L5 and S1 dermatomes bilaterally. He also had hyper pigmented patches on both legs worse on the left leg and skin over both feet was shiny with some areas of hair loss. Cardiovascular and chest examinations were unremarkable. He had a pulse rate of 88 beats/min, regular, of normal volume and synchronous with other pulses. His blood pressure was 110/70 mmHg. Random blood glucose was 25 mmol/L.

An assessment of uncontrolled type two Diabetes mellitus with Autonomic Neuropathy(bladder dysfunction and Erectile dysfunction), Sensory Neuropathy and Possible Retinopathy and Nephropathy was made.

Abdominopelvic ultrasound showed a grossly distended bladder with clear urine(even after patient voided) with a wall thickness of 3 mm. Both kidneys were normal in size and outline. The right measured 9.3 ×4.4 cm while left measured 9.9 ×4.2 cm in longitudinal and antero-posterior diameters respectively. Both showed good corticomedullary differentiation. The renal parenchyma and sinuses were uniform however, the calyces were dilated on both sides and worse on the left. The Liver, Gallbladder, Biliary tree, pancreas, prostate and spleen were all within normal limits. An impression of neurogenic bladder with backpressure effect on the kidneys was made.

Electrocardiogram showed Normal Sinus Rhythm

THE INVESTIGATION RESULTS ARE AS FOLLOWS:

Table 1 : Serum Electrolytes

PARAMETER	VALUE
Sodium	136mmol/l (Ref 120-140)
Potassium	3.8mmol/l (Ref 3-5)
Creatinine	189umol/l (Ref 50-139)
Urea	2.9 mmol/l (Ref 2.5 -5.8)

Table 2: Fasting Lipid Profile

PARAMETER	VALUE
Total cholesterol	6.2 mmol/l (2.5-6.5)
Triglycerides	0.6 mmol/l (2.3)
HDL	2.3 mmol/l(1.04)
LDL	3.6 mmol/l(3.9)

Table 3: 24-Hour Urinary Profile

PARAMETER	VALUE
Volume	2,550 mls
Creatinine Clearance	6.7 mls/min
Urea Clearance	11.1 mls/min
Sodium	40 mmols/L
Urea	19 mmol/L
Potassium	13.5 mmol/L
Protein	0.1g/24hrs
Creatinine	711 umol/L

A working diagnosis of uncontrolled Type 2 Diabetes Mellitus with Autonomic Neuropathy(Diabetic Cystopathy), Sensory Neuropathy, Nephropathy and Retinopathy was made.

He was subsequently counselled about Diabetes mellitus and its chronic complications. He was also counselled on foot care, lifestyle modifications, insulin administration and hypoglycaemia . He was also encouraged to do regular timed voiding . He was thereafter commenced on Subcutaneous Insulin [Humulin 70/30]24 units AM and 12 units PM. He was also placed on Tab Lisinopril 5 mg and Tab Methylcobolamin 1500 IU daily respectively.

He was referred to the Urology, Opthalmology and Nephrology clinics for further evaluation.

On his return to clinic after two weeks, blood glucose was 10.3 mmol/L and had been successful with regular, timed voiding.

DISCUSSION

INTRODUCTION

Diabetes Mellitus is a chronic disorder of fuel metabolism with a rise in prevalence worldwide over the past 3 decades. According to the International Diabetes Federation Atlas Sixth Edition Published in 2013, 382 million people worldwide have diabetes with an estimated 17.5 million who are yet to be diagnosed with a resultant $548billion expended on diabetes care globally. Nigeria accounts for an estimated 3.9 million of the 19.8 million diabetic population of subsaharan Africa.[1]

The chronic hyperglycaemia of diabetes which develops over years is associated with long term damage and dysfunction and failure of multiple organ systems including the genito-urinary system.

National Institutes of Health-National Institute for Diabetes & Digestive &Kidney Diseases Bladder Research Progress Review Group's August 2002 report noted that " because diabetes significantly alters the urinary tract, a large proportion of people with this disease will develop costly and debilitating urologic conditions".

Among diabetics, about 80% of them have lower urinary tract complications, a higher rate than that of widely recognized complications such as neuropathy and nephropathy which affect less than 60% and 50% respectively.[2] The most common lower urinary tract complication of Diabetes is bladder dysfunction. More than 50% of diabetics have bladder dysfunction.[3] Development of bladder dysfunction is insidious, often manifesting years after onset of diabetes.

Classically, diabetic bladder dysfunction is referred to as cystopathy, a constellation of clinical and urodynamic findings associated with long term diabetes. Cystopathy is characterized by decreased bladder sensation, increased bladder capacity, impaired detrusor contractility and increased residual urine.[4] Our patient presented with all of these.

It is often debated if it is a pathology of storage or voiding dysfunction. However, there is an emerging consensus that diabetics with bladder dysfunction could manifest a considerable diversity of signs and symptoms

In most asymptomatic patients with diabetes, Ueda et al found increased bladder volume at first sensation to void and a decrease in detrussor contractility resulting in increased residual urine with a 25% increase in detrusor overactivity.[5] In contrast, Kaplan et al in a review of urodynamic findings in 182 diabetes cases revealed that 55% had detrusor overactivity with 10% areflexic and 11% indeterminate.[6]

Subsequently, the International Continence Society recommended the term diabetic bladder dysfunction to describe both problems of storage or voiding or both that may occur in diabetics.[7]

Normal function of bladder is to store and void urine. This is done via a highly coordinated and controlled process under the control of both the central and peripheral nervous systems. The normal bladder has two phases; filling and emptying. A normal person will void approximately 4-8 times daily.[8] Thus, the bladder is in storage mode most of the day. The micturition center is in the frontal lobe of the brain and relates with the bladder via the pontine micturition center and sacral spinal cord.[8] This leads to excitation of the detrusor muscle when micturition is socially convenient and inhibition when otherwise.

PATHOPHYSIOLOGY

The exact pathophysiologic mechanism of diabetic cystopathy is still not fully understood. It has been attributed to several causes including autonomic axonopathy, diuresis induced myopathy, metabolic alterations in adrenergic and cholinergic receptors in detrusor smooth muscle with oxidative stress leading to smooth muscle damage and apoptosis.[9]

The traditional view recognizes autoimmune neuropathy as the prime cause of diabetic bladder dysfunction.[10] Daneshgari et al proposed the temporal theory of diabetic bladder dysfunction which proposes that hyperglycaemia induced polyuria plays a major part in the physiologic process by causing compensatory bladder hypertrophy and associated neurogenic and myogenic alterations[1]

Long standing diabetes and its resultant hyperglycaemia is associated with poor detrussor contractility due to hyperglycaemia induced alteration in expression of protein regulated myosin mediated contraction.[11] The urothelium is crucial for the normal 2 way communication between epithelial cells and tissues.[12] It is thought that there is hyperglycaemia associated defect in urothelial receptor expression and thus contributing to underlying bladder dysfunction.

Steers et al postulated that afferent pathways innervating the bladder may be culpable .[13] However, this is yet to be substantiated.

CLINICAL FEATURES

It could be asymptomatic in the early stage. It could manifest with symptoms of decreased bladder contractility such as hesitance, weak stream, dribbling, sense of incomplete emptying and infrequent voiding. Urinary retention as seen in our patient is a frequent finding. Involuntary bladder contraction could manifest as nocturia and urgency. Incontinence is also a frequent finding and said to be more among females.[14] Other signs of autonomic neuropathy such as erectile dysfunction, gustatory sweating, gastroparesis, resting tachycardia and orthostatic hypotension could be present. Various other chronic complications like retinopathy, nephropathy, cerebrovascular , cardiovascular and peripheral vascular disease could be present.

INVESTIGATIONS

Urinalysis/Microscopy Culture and Sensitivity which could show evidence of infection.
Abdominopelvic ultrasound to visualize the pelvic organs especially the bladder which is usually distended.
Blood glucose/ Glycated haemoglobin which is usually in the diabetic range and would confirm underlying Diabetes Mellitus
Urodynamic Studies(Uroflow rate, cystourethrogram, post void residual urine) to show volume of urine voided per unit of time, any obstruction and detrusor activity.
Electromyogram which would measure the electrical activities of the detrusor muscle even at rest.
Cystoscopy would help in diagnosing any existing bladder lesion.
Electrolytes, urea and Creatinine to rule out any renal impairment.
Fasting Lipid Profile to identify and coexisting dyslipidaemia.
Electrocardiogram, fundoscopy and 24 hour urinary profile to diagnose complications of Cardiovascular system, retinopathy and nephropathy respectively.

MANAGEMENT

Onset of complications in diabetes are better prevented or delayed by good glycaemic control and early diagnosis of diabetes. Goal of management is to provide symptom relief and prevent complications. Treatment primarily involves behavioural therapy with limited role for pharmacological treatment and surgery.
Behavioural therapy encompasses achieving good glycemic control, lifestyle modifications and specific therapies directed at improving bladder function. Weight reduction improves urinary incontinence especially in women.[15] Some studies have shown that supplementation of diet with thiamine and cyclohexenoic acid can improve cystopathy.[16] Pelvic floor exercises strengthen the pubococcygeus muscle and may be beneficial.
Clean intermittent self catheterization is the primary therapy for impaired or absent detrusor contractility . The interval between catheterizations should be designed to maintain residual volume of less than 100mls. Timed voiding should be emphasized.
Antimuscarinic agents are useful for patients with overactive bladder by inhibiting binding of acetylcholine at muscarinic M2 and M3 receptors on detrussor smooth muscle cell e.g Tolterodine, Oxybutynin and newer agents like Solitenacin and Darifenacin.[17]
Bethanechol chloride is a parasympathomimetic drug with relatively selective action at the urinary bladder. It may be useful in chronic states of detrusor atony or hypotonicity.[18]
Surgical procedures that increase urethral outflow resistance like bladder neck suspension, periurethral bulking therapy, sling procedures and artificial urinary sphincter have all been tried. Procedures like sacral neuromodulation, detussor myomectomy and bladder augmentation have been postulated to improve bladder capacity.[19]

CONCLUSION

Diabetes Mellitus is a rapidly increasing global burden. With projections of expected increased prevalence with resultant complications, cost to healthcare system and patient's quality of life is astronomic. Behavioural therapy is the mainstay of treatment for diabetic cystopathy. Early detection of diabetes and optimal glycaemic control are essential in delaying or preventing onset of diabetic cystopathy.

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