

Case report:

The Management of Pediatric Type-1 Diabetes; A Case Study

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Abstract:

Diabetes mellitus is co-morbid with various metabolic and psychological disorders characterized by high blood glucose levels due to defects in insulin availability in body. Glucose work as a fuel to provide energy for all physical activities whereas in type 1 diabetes, the beta cells in the pancreas becomes unable to make insulin because of autoimmune disease, consequently there is no insulin to convert glucose leading to low energy level and other metabolic disorders. The disease is also called juvenile diabetes as usually starts to appear in childhood, that cannot be controlled but can be managed by timely diagnosis and care. The present study covers the case of a young child having type 1 diabetes in childhood and its consequences. The child inherited from paternal grandmother however other siblings were deficit. The case was become complicated because of poor timely investigations and management. Furthermore weak awareness and inappropriate healthcare practices made the disease more knotty. The work also covers the measures that should be taken by the health care providers through proper counseling and educating the parents and family, furthermore an accurate guidelines regarding nutrition, medications should be utmost. Self identification of having diabetes is necessary for school going children in order to manage abrupt hypoglycemic corollaries.

Keywords : Autoimmune disease ; insulin ; diabetes; hypoglycemic

*Bangladesh Journal of Medical Science Vol. 19 No. 02 April'20. Page : 326-332
DOI: <https://doi.org/10.3329/bjms.v19i2.45017>*

Introduction:

The current available data reveals about the limitation and guidelines for the management of diabetes in adults whereas recommendations regarding children and teenagers have usually been given short accountability that is leading an increased rate of complexity of the disease as like myopathy, neuropathy in society¹. All the same information provided is based on evidence from published studies and cases support and assist to control and manage the diabetes at early ages². Here a significant clinical research of 4Ts, the mostly found symptoms of type 1 diabetes should be perceived as like frequent urge to go toilet specifically during the night If a child start

to regularly wet the bed and stops for sometime it could also specify a sign of diabetes. Second T is the unusual thirst and that increase in night. Third one is tiredness as lack of insulin, as takes place in type 1 diabetes, cells of the body cannot take in glucose from the blood for energy which can leave the body exhausted. The lack of insulin, body becomes unable to get enough glucose from the blood into cells and consequently break down fat and muscle into ketones starts for the alternative source of energy leading to loss of body weight that is the fourth important sign. These all signs of Type 1 diabetes in children dictate different standards of care and entirely differ from adults and children of various ages³⁻⁵.

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Case Study:

The present case is a paradigm of improper management of diabetes directing to complications. According to clinical manifestation a boy child having age of 13 was diagnosed with diabetes. The history of patient reveals that the Type -1 diabetes was identified at the age of 3.5 years when was hospitalized in local premises setting with the complain of high fever and was treated with antipyretic simply however his tests results come out with diabetes that was left devoid of management, consequently after sometime parents observed atypical symptoms as like frequent urination, increase appetite and thirst.

In current case the boy was observed by the parents with similar symptoms of 4Ts and was taken to clinical setting where he was given insulin injections along with antidiabetic medications and case became under controlled but not actually, as with the passage of time other severe symptoms aroused, a deep sore on the foot of child. For the treatment parents approached to metro city general hospital and clinical settings but found no significant treatment. Than after words the patient was shifted another reputed tertiary care hospital where he was registered for proper management and according to the hospital physicians and doctors, the child was diabetic from the very early age but was not diagnosed and treated properly and consequently the sore on foot was not an ordinary cut but was an infectious diabetic foot they further informed that the reason behind boy's diabetes was the side effects (or wrong combination) of antipyretic medications he was prescribed at the age of three. It should be noted that boy was delivered through operation and in his family history his grandmother (from paternal side) is also diabetic . Patient's parents and siblings are not suffering from diabetes.

Case Summary

Date: 18th February, 2017

Blood group: O+VE

13 yr old, weight 30 kg

Test result from Radiology department:

K/C IDDM Presented both foot gangrene.

According to Clinical Investigations:

Patient is virtually stable

Femoral pulses are palpable & femoral and popliteal pulses are weak.

According to laboratory Investigations:

Hb-8.0 (Hb A/C --15.6)

TLC-15.6 (N- 80, L-17)

PLAT. – 498000

B.P between 98TH and 99TH

Na+ 134, K+ 4.3, Cl- 100, Ca+ 8.8

ANA –ve, ASMA –ve, AMA –ve

Protein C & S and Antithrombin III levels are normal

According to OIE Investigations:

Acute child oriented e^- time, place & person.

e^- H/R- 1001- R/R-281- Temp- A/F

CVS- S1+S2+0

Chest- NVB + B/L Equal air entry

Abd opt, N.T, NOM CNS Intact

Femoral pulses palpable

CT abdomen contrast □ Abdominal aorta thrombus (partial occlusion at level of renal arteries)

CT Angiogram □ elongated mass below SMA/ at right renal artery not occluding aorta or any branch lumen □ possible attachment to posterior aortic wall

e^- embolization/ tumor?? (Sarcoma)

Protein C & S and antithrombin are normal

ANA, AMA & ASMA –VE

Patient was on warfarin, ascard, steroids and insulin.

-Vascular surgeon suggested for biopsy.

Vascular Clinic Results (Date: 20th February, 2017):

According to the Vascular Surgeon the boy had an embolic episode which involved both infrapopliteal vessels. Legs had turned in gangrene.

è Right leg up to foot and need below knee amputation.

è Need of amputation, as the boy has strongly two femoral and popliteal pulses and the aortic clot was not giving any obstructive feeling and was sediment to wall. At that moment touching aorta is not a brilliant idea due to obstruction consequently amputation below knee in Right leg to avoid sepsis was suggested.

CT SCAN Abdomen e^- contrast (Date: 07/02/2017):

Defect seen in abdominal aorta Partial occlusion level of renal arteries consistent thrombosis embolism.

CT Angiogram (03/02/2017): Abdomen. Aortic mass

& peripheral diameter 8.6 mm thrombus Below 8 MA/ at level of right renal artery.

U/S Abdomen (01/02/2017): Normal

COLOUR DUPLEX OF ARTERIES AND VEINS OF RIGHT LEG (31/01/2017): No flow is not within the dorsalis pedis arteries and small arteries of R. foot

Echo (31/01//2017):_Normal size LV function. (AR Trace). -EF 63%

Ct Scan report

- * History of Gangrenous foot
- * Suspecting abdominal mass.

Filling defect seen in abdominal aorta causing its partial occlusion at the level of renal arteries.

Both kidneys show normal enhancements and normal excretion of contrast.

The liver appears unremarkable. The intra and extra hepatic bile ducts and gall bladder appear unremarkable.

Pancreas, spleen and adrenal glands appear unremarkable.

No lymphadenopathy and ascetic fluid noted.

Imaged bowel structures appear unremarkable.

The perirectal fat, perinephric fat, periureteric fat, perivesicle fat and ischiorectal fossa are unremarkable.

The urinary bladder, seminal vesicles and prostate appear unremarkable.

Imaged bones and spine appear unremarkable.

Imaged sections of lower chest appear unremarkable.

Imaging findings in abdominal aorta are consistent with thrombo-embolism.

Would recommend CT abdominal angiography for further evaluation.

CARDIAC COMPUTED TOMOGRAPHY

AORTOGRAM BELOW T12 BOTH LOWER LIMBS (DATE: 03 FEBURARY' 2017)

Contrast: Non-Ionic

Volume: 60 ml

Machine: Dual Source Siemens Somatom Definition

Indication: Weak pulses of right lower limb

No calcification in abdominal aorta and its branches.

There is a linear elongated mass (diameter= 8.6mm and carniocaudally 31.7 mm) below the superior

mesenteric artery/ at level of right renal artery not occluded aorta or any branch artery lumen?? Possible attachment to posterior aortic wall.

Right common peroneal artery is not opacied (even in delayed phase).

Arteries of both feet are not visualized (probably due to occlusion).

Both common iliac arteries and its branches show no abnormality.

Both common femoral, superficial femoral and profunda femoris arteries are well outlined by contrast with no narrowing, occlusion or stenosis.

Both popliteal, anterior and posterior tibial arteries and left peroneal arteries are within normal limits.

No evidence to suggest arteriovenous malformation.

No aortic aneurysm.

No visceral infarct or intra abdominal mass or lymph node noted.

Abdominal aortic mass with peripheral embolization possible etiology tumor (sarcoma) thrombus.

Ultrasound Result:

Ultrasound abdomen (Date: 01 FEBURARY, 2017)

- * Measures 13.2cm normal in size, texture and echogenicity with regular margins.
- * No evidence of any mass, cyst or generalized infiltration.
- * Intraheptic ducts are not dilated.

Portal vein: 0.6 cm

Gall bladder: normal walls. no stone or growth seen.

Pancreas: shows homogenous echo texture. no mass or duct dilation noted.

Spleen: measures 8.3cm normal size. no focal mass or generalized infiltration noted.

Both kidneys: appear normal in size, shape and texture with regular margins.

- * CMO appears intact. There is no evidence of calculus of hydronephrosis
- * No evidence of any cyst, mass or generalized infiltration.

Urinary Bladder: Normal walls. No stone or growth seen.

Doppler Finding:

- * Normal scan of abdominal viscera. The liver and kidneys do not show any textural changes.

- * Portal veins appears potent with normal flow patterns and respiratory variation
- * No evidence of any significantly enlarged lymph nodes, bowel wall thickening, ascites, worms, mass or collection noted.
- * Both adrenals appear normal. They do not appear echogenic or prominent.

Ultrasound Doppler Right Leg (Date: 31 January' 2017)

Colour Duplex Sonography Of Arteries And Veins Of right leg:

- * Rt. Common femoral artery, distal superficial femoral artery, popliteal artery, anterior and posterior tibial arteries show no evidence of plaque formation or occlusion.
- * Rt. Common femoral vein, popliteal vein and deep veins in the calf are patent. There is no evidence of thrombus in these veins. The veins are compressible. Augmentation is noted on distal pressure.
- * No plaque formation or occlusion is seen in arteries of right leg.
- * No evidence of deep vein thrombosis in right leg.
- * No flow is noted within the Dorsalis pedis artery and small vessels of right foot.
- * Marked soft tissue edema and cellulitis is seen over right foot. CT Angiogram is advised.
- * No definite evidence of any joint effusion or collection noted.

Echocardiography Report

Left ventricle	Systolic → 22 Diastolic → 33 Septal thickness → 10	EPSS (<7) EF % (55%) Post wall thickness	- 63% 10
Left Atrium	24	Aorta	22
Mitral valve area	-	Aortic valve	-
Right ventricle	-	Pulmonary artery	-

Structural Interpretation

- * Situs Solitus
- * Both A.V valves are present
- * Normal L.V size and function
- * Normal mitral and aortic valve.
- * No ASD or VSD seen.
- * Normal RV size and function.
- * Normal pulmonic and tricuspid valves
- * No pericardial effusion seen around the heart.

Doppler

Flow abnormality (colour flow mapping): AR (Trace)

Pressure gradient (mmHg): -

Estimated RV/MPA pressure (mmHg): 20 mmHg

Final Echo Dx: Normal size, LV normal function, AR trace.

Lipid profile (Date: 15 JANUARY' 2017)

TEST NAME	RESULT	NORMAL RANGES
Cholesterol.....	247 mg/dl	<u>NICEP Recommendation:</u> Without coronary artery disease:<200 (DESIRABLE) With coronary artery disease:<160 (OPTIMAL)
HDL-Cholesterol.....	25 mg/dl	<u>NICEP Recommendation:</u> Without coronary artery disease: >40 With coronary artery disease: >=60
LDL-Cholesterol.....	190 mg/dl	<u>NICEP Recommendation:</u> Without coronary artery disease: <130 (DESIRABLE) With coronary artery disease: <100 (OPTIMAL)
Triglycerides.....	159 mg/dl	<150

Flow Sheet From Nephrology Ward (Date: 29 January' 2017)

DATE	29/1/17		8/2/17	16/2/17			
BLOOD CP							
Hb%	8.0		6.4	9.2			
TLC	15.6		298000	16800			
BLC-N	80		81	92			
L	17		08	06			
E	02		06	01			
M	1		05	01			
PLATELETS	496		340000	1410,000			
MCV							
MCH							
MCHC							
PCV							
HCT							
RDW							
Retic Count							
ESR							
M.P.							
PERIPHERAL SMEAR	C.R.P- 72mg/Dl		ESR- 50mm/18				
+h			30/1/17	2/2/17	10/2/17	11/2/17	16/2/17
S/E							
Na	134	134	134		139	138	139
K	4.3	3.8	3.6		29	4.4	4.8
CL	100	102	96		98	102	105
Ca	8.8	8.2					
HCO ₃			28				
Mg							
P							
BLOOD SUGAR							
(i)							
(ii)							
(iii)							
(iv)	24/1/17				11/2/17	13/2/17	15/2/17
BLOOD PT	50 sec				25.0	27.0	36.1
APTI	>1 min				32		
INR					2.26	2.43	3.19
SERUM PROTEIN							
Albumin							
Globulin							
A/G Ratio							
SERUM CHOLESTROL							
L.F.T							
Total Bilirubin					0.9		
Direct Bilirubin							
ALK. Phosphatase					190		
SGOT							
SGPT					36		
BUN							
Urea							
Creatinine			0.6		0.6		
ABGS							
PO2							
PCO ₃							
Ph							
HCO ₃							
Base Deficit							
Hepatitis B (s) Ag							
Anti HCN							

Blood picture (Date: 31 January' 2017)

- Protein C □ 136% (Normal)
- Antithrombin III □ 132% (74-126)
- Protein S 79% (Normal)
- CRP- 72 mg/dl (high)
- Hb A1C- 18.69%
- ESR- 80mm/1st hr
- CPK- 2340 (HIGH)
- ANA □ -ve
- ASMA □ -ve
- AMA □ -ve
- Gastric Aspirate □ gene expert □ -ve

Measures for Management:

In this regard Professional including doctors and pharmacist are liable for caring children with diabetes, as at that age, are incapable to provide own diabetes care. Consequently, the family, caretaker and parents must be endowed with the education about the management of diabetic child and should move with gradual shift en route for sovereignty in management in middle school and high school with adult supervision.

The initial care and education must be given by a pediatric. Endocrinologist should also consulted. Preferably, diabetic child only just diagnosed with type 1 diabetes should be evaluated by a team of healthcares including pediatric endocrinologist, a dietitian along with a pharmacist to make available up-to-Date knowledge and support to assure the health stability.

Appropriate diabetes education for a child and caretakers of a child with type 1 diabetes is passionate and requires skilled educators having good communication, sympathy, humor, and detailed awareness about childhood diabetes. The information provided and the way of communication ought to be pediatric-specific. The practice of counselling and educating should be followed continuously; the purpose is to improve A1C and to decrease hospitalization rates for acute diabetes complications.

The child with diabetes should always show off identification of having disease. As in schooling and sports kids away from parents and caretakers. The sport coach specifically should aware of the child's diabetes and the symptoms and management of hypoglycemia.

Construal of blood glucose monitoring results and their use for dose calculations are of significantly importance for achieving good metabolic control that assures thorough diabetes management.

Nutrition recommendations patients with type 1 diabetes should focus on accomplishing blood glucose goals without excessive hypoglycemia⁶ and with normal growth and development, accordingly healthy Nutrition should be recommended and provided to diabetic children to guarantee possible intake of essential vitamins and minerals following with low saturated fat and sugar. DKA is an end result of insulin insufficiency leading to hyperglycemia and an accumulation of ketone bodies in the blood, with subsequent metabolic acidosis. The overall mortality for a child with DKA is 1-3%^{7,8}. These patients require close physician monitoring, with frequently blood chemistry determinations to direct therapy.

Conclusion:

A patient having diabetes type 1 from early childhood faces many confronts, which become more complicated as life continues. There must be a proper management plan that should be followed by the care taker, parents and health practitioner, including thorough blood sugar tests out, balanced diet with essential nourishment with required medications and insulin. Along all this physical activities and work out significantly accountable for good glycemic control. The taking of health care by the parents and doctor may be all-time obligation to the child to fight with the complications that can arise from extreme blood sugar like neuropathy renal disorders and others related to vascular problems that can be cope up by regular endocrinology and ophthalmology consultancy.

Ethical clearance: Ethics approval was taken from , Institute of Pharmaceutical Sciences, Jinnah Sindh Medical University, Karachi.

Conflict of interest: None declared

Individual Contribution of the Authors:

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