

DIABETES MELLITUS

LEARNING OBJECTIVES

- Describe the pathophysiology and risks of diabetes and the value of blood glucose control.
- Appropriate screening and correct diagnosis of diabetes
- Develop an effective treatment plan for diabetes
- Communicate to the patient and family necessary steps and messages in the understanding, prevention and control of diabetes
- Prevention and management of complication
- Knowledge of need of referral

TEACHING STRATEGIES:

- Use lecture or informal presentation for didactic material, small group discussion for prevention, counseling, and patient education issues.
- Role play patient education issues
- Case study

MATERIALS AND EQUIPMENT NEEDED:

- Overhead projector and transparency
- White board or flip chart and markers for summarizing major points

LEARNING POINTS:

Diagnosis of Diabetes:

- Fasting plasma glucose > 126 mg/dl
- 2 hr. postprandial plasma glucose > 200 mg/dl
- Any random plasma glucose > 200 mg/dl, together with polyuria, polydipsia, weight loss, visual blurring
- Must confirm diagnosis with two abnormal plasma glucose results on separate days

Clinical evaluation of diabetes:

History

- Symptoms of diabetes (urination, thirst, weight loss, vision change)
- Current medications
- Past medical history
- Family history (focus on diabetes, heart and vascular problems, kidney failure)
- Evidence of current diabetic complications (vision loss, edema, vascular problems in feet, foot ulcers, paresthesias)

- Other risk factors (smoking, alcohol abuse, drug abuse, obesity, history of cholesterol elevation or hypertension, family history of diabetes)
- Life style factors (occupation, level of daily exercise, eating patterns, economic level)
- Dietary history

Physical Examination

- Height and weight (calculate BMI)
- Blood pressure
- Ophthalmoscopic exam (visual acuity, fundoscopic exam – refer for complete exam)
- Mouth and dental condition
- Thyroid abnormalities
- Cardiac exam
- Abdominal exam
- Peripheral pulses and distal capillary circulation
- Skin condition and edema, especially legs
- Neurological exam (especially distal DTR, foot pin, vibration, position, temperature sensation)
- Condition of feet and toes

Initial Laboratory Evaluation

- Fasting plasma glucose
- Hemoglobin A1C
- Fasting cholesterol, LDL, HDL, Triglycerides
- Creatinine
- Urine albumin, ketones, and glucose (dipstick)
- Urine for quantitative albumin (or 24 hr. urine for albumin and creatinine clearance)
- ECG in adults

Referral

Consider initial referral to the following if significant disease is found:

- Ophthalmology – if retinal disease is seen or suspected
- Nephrology – if initial serum creatinine is >1.5
- Neurology – if peripheral neuropathy is noted
- Emergency Dept. – if severe hyperglycemia is noted (>400)

Additional risk factors that increase the morbidity and mortality of diabetes:

- Hypertension
- Smoking
- Hyperlipidemia
- Age: Prevalence and risks increases with age
- Obesity and age >40 years
- Hx of gestational diabetes or delivery of large babies $> 4\text{kg}$.
- Alcohol

Management of chronic diabetes, Type II

Review correct measurement of blood glucose:

- Timing of measurement
 - Ideal measurement – after fasting for 8-10 hours
 - 2 – 4 hours postprandial may give some information on effectiveness of antiglycemic medication
- Encourage patients to consider purchasing their own glucometer and strips for self-monitoring. Teach patients correct use of machine and recording of results. Advantages include:
 - Greater awareness of relationship between activity, exercise, diet, and medication
 - Greater collaboration in management of disease
 - Improved communication with health care providers

Initial management of chronic diabetes Type II

- Goal of management – fasting or before meal plasma glucose of 90 – 130 mg/dl (whole blood – fingerstick method – 80 – 120 mg/dl)
- Initial trial of diet – calorie restricted to 1600 – 1800 calories; 50-60% starchy carbohydrates, 20% fats, 20% protein
 - Main goal of diet is gradual weight loss in obese patients to increase insulin sensitivity
- Regular exercise program – daily for 30 minutes continuously
- Evaluate emotional adjustment to diagnosis and management goals; counsel as needed
- If diet, exercise, and weight loss does not achieve goal glucose levels with 2-4 months, begin medication:

Step 1: Tolbutamide – begin at 500 mg bid, increase as needed to 1 gm bid

OR

Step 1: Glibenclamide – begin at 2.5 mg/day, increase as needed to 20 mg/day

If no response to above:

Step 2: Add Metformin – begin at 500 mg/day, increase as needed to 1250 mg bid

If no response to above:

Step 3: Begin insulin therapy, usually by discontinuing oral medications – consider referral for initiation of insulin therapy

Maintenance management of chronic diabetes type II

- Follow flow sheet protocol for visits, usually monthly until well stabilized
- Monthly:
 - Blood pressure
 - Weight
 - Fasting glucose
 - Urine albumin
 - Foot exam
 - Medication dose review
 - Patient education – may rotate topics discussed
 - Monitor for stress, anxiety, and depression
- Every 3 months
 - Neurologic exam (especially lower extremities)

- Every 6 months
 - Hemoglobin A1C
 - Quantitative albumin/creatinine ratio (spot urine for quantitative albumin, serum creatinine)
 - Refer to specialist if Alb/Creat ratio >30 for followup and consideration of starting captopril or enalapril to preserve renal function
- Every year (especially after 10 years duration of diabetes or age >40)
 - Refer to ophthalmologist for fundoscopic evaluation
 - Monitor serum cholesterol, HDL, LDL, Creatinine
 - ECG in adults > 40 years

Management of special diabetic populations:

Hypertension

Control BP as needed: goal 140/85

Elderly

Show increased sensitivity to anti-diabetic medication; reduce initial dosage by 50%

Renal disease

Follow serum creatinine and Alb/Creat ratio regularly; consider adding an ACE inhibitor in consultation with nephrologist

Pregnancy

Refer to Ob/Gyn for management during pregnancy

Coexisting heart or vascular disease

Refer to cardiologist for co-management

PREVENTION ISSUES AND HEALTH EDUCATION MESSAGES:

Screening for diabetes

- Consider screening all adults over 40 years of age with fasting blood sugar every 2-3 years
- Begin screening at earlier age with a positive family history, obesity, or symptoms of diabetes
- Involve the community in diabetes awareness and screening

Nutrition

Smoking cessation

Obesity

Patient and Family Counseling:

Permanent, life-long treatment

Potential diabetic complications and need for regular monitoring:

- Kidney disease and failure
- Eye disease and blindness
- Increased atherosclerosis, coronary artery disease and strokes
- Foot ulcers and infection
- Skin changes of the lower extremity

Foot care

Management of hypoglycemic attacks

Counseling in family planning if appropriate

Injection techniques (when insulin used) and rotation of sites

Lifestyle modification:

- o Smoking cessation
- o Diet control
- o Weight loss
- o Physical activity
- o Social and psychological factors

CRITICAL ELEMENTS FOR REFERRAL:

- For persistent fasting hyperglycemia
- Pregnancy and diabetes (either gestational or pre-existing diabetes)
- Diabetic ketoacidosis.
- Serious acute illness in addition to diabetes
- When switching from oral hypoglycemic to insulin
- Problems such as:
 - Chest pain
 - Mental confusion
 - Painful neuropathy
 - New onset of painful neuropathy

CASE STUDY:

Name of Patient : Ali

Sex: Male

Date of Birth: 20th October 1947

Date of Visit: 24th May 1999

Vital Signs: Pulse: 84

Resp.: 16

Blood Pressure: 130/85

Weight: 102 kg.

Blood glucose: 320 mg./dl. (Random)

Medical History:

Last week the patient felt sore throat and feverish. It is moderately improved at this visit, but still somewhat painful. This same pain has occurred several times in the past, and usually resolved spontaneously within a few weeks.

Upon questioning, the patient admits being previously told that he has high blood sugar, and has taken medicine for this for up to two months in the past. When asked why he stopped the medicine, he said that it was because he felt better. He has not noticed any chest pain, shortness of breath, frequent urination, unusual thirst, weight loss, general weakness, swelling of the ankles, or change in appetite. He does have several brothers who have been diagnosed as being diabetic.

Physical Examination:

The throat is pink and congested, the neck shows no adenopathy and carotid pulsations are equal bilaterally. The chest is clear to auscultation, and the heart has no murmurs. There is no peripheral edema.

Topics of discussion regarding case study:

- 1.- What are the major medical problems identified in this patient?
- 2.- What important additional elements of the history should be asked?
- 3.- What additional elements of the physical exam should be done?
- 4.- What is an appropriate plan of management of this patient at this point?
- 5.- What counseling issues would be most appropriate for this patient at this point?

CRITICAL ELEMENTS OF COMPETENCE FOR EVALUATION:

- Correct measurement and recording of blood glucose
- Proper diagnosis and classification of type of diabetes
- Appropriate non-pharmacologic and pharmacologic management of diabetes, diet, physical activity
- Consideration of additive risks in treatment of diabetes
- Appropriate patient education regarding diabetes management plan, and life-style modifications
- Knowledge of need for referral