



Case 3: Trying to loose bodyweight

Learning issues:



- Hormones involved in metabolism of carbohydrates and fats and their role in maintaining normal blood glucose.
- Biochemical and physiological interactions between the different components of metabolic symptoms (such obesity, dyslipidemia, high blood pressure and impaired blood glucose tolerance).
- The mechanisms by which obesity causes insulin-resistance and the development of diabetes type 2.
- Interpretation of the clinical manifestation and investigation results obtained from a patient with metabolic syndrome.
- Differences between HDL and LDL.
- Role of changing life style (including weight loss, low calorie diet and stopping smoking) in managing metabolic syndrome.

❖ Key information and Presenting problems:

- Moamed, male, 50 years old, Teacher
- **BMI : 33**
- **Blood pressure 170/95-175/93 mmHg**
- **High blood cholesterol**



New problems and history:

- Overweight since childhood.
- Tried several regimens but with little benefit.
- **Previous blood tests showed:**
 - **High blood pressure – (used Enalapril "ACE inhibitor" for 5 months).**
 - **High blood cholesterol.**
 - **Viral hepatitis – all negative.**
 - **little raised liver function tests (due to accumulation of fat in the liver cells).**
- Tried to exercise at gym for few weeks only.
- **Bad eating habits (fatty high caloric foods) and lazy life style (sitting at home and watching TV in evenings)**
- No history of angina, surgery, hospital admissions, renal troubles.
- No allergies , Medications, or Alcohol consumption.
- **His father has DM and had heart attack 5 years ago (still alive and on medications)**
- **His Mother, two brothers and three sisters are all over-weight**
- **Heavy smoker (20cigarretes a day for the last 25 years)**

Clinical examination

- Index and middle fingers of his right hand have nicotine stains
- 1.70 meters tall – body weight is 96 kg (BMI is 33 and waist circumference is 105)
- No evidence of central obesity or hypothyroidism

Vital signs

- All normal except Blood pressure 170/95 mmHg (normal 100/60-120/80mmHg)

Abdominal examination

- Live is palpably enlarged with liver span of 16 cm (normally less than 13 cm)
- No abdominal tenderness, rigidity, or swellings
- Auscultation of the abdomen is normal

Cadiovascular and Respiratory systems

- Normal, apart from his blood pressure

❖ Investigations :

Complete Blood Count (CBC)

Blood Test	Mohamed	Normal range
Blood haemoglobin	14	11.5-15.5 g/100ml
White blood cell count	8×10^9	$4-11 \times 10^9/L$
Platelet count	242,000	160,000-500,000 mm^3

Blood Biochemistry

Blood Test	Mohamed	Normal range
Fasting blood glucose	6.5 ↑	3.8-5.8 mmol/L
Total Cholesterol	6.1 ↑	<5.2 mmol/L
Blood Triglycerides	3.1 ↑	<1.7 mmol/L
HDL Cholesterol	0.89 ↓	>1.03 mmol/L
LDL Cholesterol	4.21 ↑	<2.84 mmol/L
Blood urea	2.9	2.5-6.7 mmol/L
Serum creatinine	101	79-118 $\mu\text{mol/L}$

Liver Function Tests

Test	Mohamed	Normal range
Serum bilirubin	5	0 - 19 $\mu\text{mol/L}$
Serum aspartate aminotransferase (AST)	40 ↑	0 - 34 IU/L
Serum alanine aminotransferase (ALT)	87 ↑	0 - 50 IU/L
Serum alkaline phosphatase (ALP)	120	0 -120 IU/L
Serum albumin	39	35 - 50 g/L

Cont. Investigations

Viral screening for hepatitis	Negative
Ultrasound Abdomen *to assess the enlarged liver*	* An increase echogenicity* of the liver tissue * No masses found, gallbladder, biliary tract, kidneys are all normal
Chest X-Ray *Because Mohamed has been smoking for 25 years*	Bilateral hyperinflation of the lungs and flat diaphragm
Electro-cardiogram *Because Mohamed has high blood pressure for number of years*	Evidence of left ventricular hypertrophy

❖ Diagnosis:

Metabolic syndrome

(it is a cluster of conditions that occur together: increased blood pressure, a high blood sugar level, excess body fat around the waist and abnormal cholesterol levels)

*Echogenicity is higher when the surface bouncing the sound echo reflects increased sound waves.
Tissues that have higher echogenicity are called "hyperechogenic" and are usually represented with **lighter colors on images in ultrasound.**

❖ **Management:** Change life style by decreasing the amount of fats and calories in food, exercising regularly with the aim to reach a BMI in the range of 23 – 25

- Referral to a dietitian to manage the daily calorie requirements
- Stop smoking (smoking cessation program)
- Enalapril tablets for high blood pressure and review in 6 week

❖ **Prognosis:**

- After 6 weeks later Mohamad review Dr.Khalid and he has been following rigid regime and does cardio exercise and swimming at the gym with a lot of support from his family. His BMI is 28 and his blood pressure in the range of 135/80 to 130/80 mmHg
- 18 months later BMI is 25 and blood pressure in the range 120/75 to 120/70 mmHg. Blood lipids and liver function tests are all back to normal

INTERPRETATIONS OF THE PATIENT'S CLINICAL MANIFESTATION AND INVESTIGATION RESULTS :

Signs and findings	Interpretation
High BMI (33)	Indicate body fatness and weight gaining problems.
BP in the range of 170/95 – 175/93	As a complication of this high BP, the electrocardiogram shows evidence of left ventricular hypertrophy.
High blood cholesterol	Due to eating high calorie food containing high fat content.
LFT (raised) (AST + ALT) + Increase liver echogenicity on ultrasound	Due to accumulation of fat in the liver (fatty liver) + that's why on the abdominal examination the liver was palpable and enlarged.
Nicotine stains on the index and middle finger	Due to chronic smoking
High fasting blood glucose	The accumulation of fat in the body cells interfered with the uptake of the glucose by these body cells resulting in increased blood glucose level.
Decreased HDL and elevated LDL	Due to bad food habits.
Bilateral hyperinflation of the lungs + flat diaphragm	Because he is a chronic smoker

End of the case

Differences between HDL and LDL

LDL (Bad) Cholesterol *low density lipoproteins*	HDL (Good) Cholesterol *high density lipoproteins*
<p>*Transport cholesterol to cells throughout your body.</p> <p>*It contributes to plaque formation (Atherosclerosis) which can lead to heart attack and stroke.</p> <p>*Can be found in eggs, fatty fish, poultry and trans fats present in packaged chips, soups and other processed food.</p>	<p>*carry cholesterol away from your heart and other organs and deliver it back to your liver, where it is passed from your body.</p> <p>*Can be found in nuts, fish oils and olive oil.</p>

Role of life style changing in managing metabolic syndrome

Healthy lifestyle changes are the first line of treatment for metabolic syndrome. Lifestyle changes include losing weight, being physically active, following a heart healthy diet, and quitting smoking.

WEIGHT LOSS

The main target is to lower your body mass index (BMI) to less than 25. Exercise is a good way to lose weight, it helps in :

- *lowering BP.
- *improve cholesterol levels.
- *improve insulin resistance.

HEALTHY DIET

Eating a healthy food can improve :

- *insulin resistance.
- *BP.
- *cholesterol level.

STOPPING SMOKING

smoking can raise your risk for heart disease and heart attack and worsen other heart disease risk factors. So obviously, quit the smoking will help to Reduce the risk of getting serious smoking-related diseases such as heart disease, cancers, chronic obstructive pulmonary disease (COPD) and peripheral vascular disease

Questions

Q1: From the history Mohammed has

- 1-high blood pressure
- 2-high blood cholesterol
- 3-liver function test were raised

Q2: Why did the doctor prescribed Enalapril for Mohammed ?

It's ACE inhibitors which control his high blood pressure

Q3: Mohammed found to have a BMI of 33 that means ?

Obese person

$$\text{BMI} = \frac{\text{weight}}{(\text{height})^2}$$

Q4: What is risk factors for metabolic syndrome ?

Obesity, Sedentary lifestyle, Aging, Smoking

Q5: In metabolic syndrome patient have?

- Obesity
- High serum TGs, Low HDL cholesterol
- Hypertension , Hyperglycemia

Q6: Long standing hyper tension can lead to ?

Left ventricular hypertrophy

Q7: What dose echogenicity means?

The ability of the structures to reflect high-frequency sound waves and thus can be imaged by ultrasound techniques

Q8: Further investigation the doctor order and why?

- 1-chest X-ray
 - 2-ECG
- Because of the heavy smoking and long standing hypertension

<p>Q9: What is Chest X-ray shows ? Bilateral hyperinflation of the lungs and flat diaphragm</p>	<p>Q10: Why dose Mohammed's liver appears hyperechogenic in the ultrasound? Because Mohammed has a fatty liver</p>
<p>Q11: Tests done during investigation ? 1-CBC 2-blood biochemistry 3- LFT</p>	<p>Q12: Why Ultrasound were done ? To asses the enlarged liver</p>
<p>Q13: why he has gained a lot of body weight ? lack of exercise eating high calorie food and containing high fat contents</p>	<p>Q14: what is the effect of increase the body weight and lack of exercise ? accumulation of fats in several places in his body (abdomen , thighs , body organ) and liver cell , increase blood glucose level and LDL , decrease HDL</p>
<p>Q15: explain the liver enlargement in size and change in the liver function tests ? because the accumulation of fats in liver cell</p>	<p>Q16: explain the increase in the level of blood cholesterol and blood triglycerides ? because he eating high calorie food and containing high fat contents</p>
<p>Q17: the liver was found enlarged in abdominal examination because of? Accumulation of fat in the liver (fatty liver)</p>	<p>Q18: blood test were done to Mohammed for? To check for his blood count , blood glucose level, lipid profile</p>

Q19: what is the change will see in good and bad cholesterol (HDL and LDL) , and what is the causes of it ?

the good cholesterol (HDL) decrease

the bad cholesterol (LDL) increase

because : eating high calorie food and containing high fat contents

Q20: discuss the effect of accumulation of fats in cell body ?

1. liver enlargement and change in there function tests
2. prevent the uptake of glucose by body cell resulting in an increase blood glucose level

Q21: what is the complication associated with these problem ?

increase the blood pressure and if untreated causes a load in heart function and hence the chances in ECG

Q22: what's the outline of management plan ?

1. change the lifestyle to reach BMI in the range of 23 to 25 : diet to decrease the fat and calories in food , do exercise
2. stop smoking (program for smoking cessation)
3. decrease blood pressure by enalapril
4. follow up

Q23: what is the main causes of all problem ?

increase the body weight and lack of exercise



Thank You ...



Done by:

Yara Alanazi

Nawt Alfuweres

Amani Alotaibi

Rawan Alotaibi

Sara Alseneidi

Revised by:

Omar AlDhasee , Alaa Alharbi

