A man with hyperosmolar type 2 diabetes

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The immediate management and investigation of an acute presentation in general practice is discussed in this section. It is inspired by, but not based on, a real patient situation.

Joe, a 56-year-old overweight (body mass index of 29 kg/m²) man, comes to your general practice today because he has balanitis (he is uncircumcised). He was given cephalexin 500 mg four times daily three days ago by another doctor from your practice; however, although Joe says the swelling is improving, his foreskin is still very sore and irritated. He has no urine frequency or urgency, or lower abdominal pain. You look at his medical records as this is your first consultation with him. He says this is the usual general practice that he visits, but he does not come very often.

Regarding Joe's presentation today, what are you particularly interested in reviewing in the notes?

Answer: You need to review his records to see what medications Joe is taking and if he has any allergies. It is unusual for an adult man to develop balanitis without a significant precipitating cause.

You also want to know if he has been diagnosed with diabetes, if he has had a recent full blood count (for immunosuppressive conditions), if his general health (including kidney and liver function) is normal, if he has any immune system problems or skin disorders (such as psoriasis or dermatitis) that might affect his genitals and if he has had any sexually transmitted diseases (especially HIV, clinically obvious herpes or human papillomavirus [HPV]) genitally in the past.

Joe takes metformin 500 mg twice daily but no other medications. Tests carried out two years ago showed that he had diabetes (based on a fasting blood glucose level of 12.0 mmol/L). No other medical conditions are noted in his file. He has probable fatty liver (alanine aminotransferase level 63 IU/L, normal range under 40 IU/L; gamma-glutamyl transferase level 78 IU/L, normal under 35 IU/L) and hyperlipidaemia (fasting cholesterol level 6.7 mmol/L [ideally under 4.0 mmol/L if high risk]; triglyceride level 2.9 mmol/L [ideally under 1.7 mmol/L];

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high-density lipoprotein level 1.1 mmol/L [ideally should be over 1.0 mmol/L if high risk]; and low-density lipoprotein level 4.6 mmol/L [ideally should be under 2.0 mmol/L if high risk]). His thyroid stimulating hormone level was normal at this time.

You examine Joe. He has psoriasis on his foreskin, which is quite swollen but is still able to be retracted. He has evidence of psoriasis on the extensor areas of large joints. There is no evidence of herpes or HPV genitally but thrush is evident clinically.

What do you suggest for treating Joe's presenting problem and how do you link this condition to his general health?

Answer: You prescribe clotrimazole cream 1% twice daily for 14 days and tell Joe to continue taking cephalexin. You also prescribe methylprednisolone aceponate fatty ointment and tell Joe to mix it with the night time dose of clotrimazole for the first seven nights, applying it particularly to the areas of the foreskin affected by psoriasis, retracting the foreskin and cleaning and drying the area beforehand. He may also use the fatty ointment on the areas of psoriasis on his limbs for seven days.

You explain to John that there is a fungal infection in addition to the bacterial infection under his foreskin, and that this is largely contributed to by his high blood glucose levels. You tell Joe that fungi and other germs thrive in warm, moist areas, especially if diabetes is not well controlled, as you suspect is the case for him. You suspect the psoriasis has made it harder for Joe to maintain good hygiene, as his foreskin can trap secretions and bacteria; you discuss this issue with him. You explain to Joe that you want to do some more blood tests to assess his diabetes and his general health as his last investigations were performed over two years ago.

What would you ask Joe next and what aspects of the physical examination are you interested in?

Answer: You could begin by asking Joe about his social history. Does he live with anyone? If not, does he have children or close friends? Does he work, and if so what does he do, and does he enjoy it? What are his hobbies, does he exercise? Is he generally happy?

You then need to ask Joe what he knows about diabetes and its management. Among the questions that need to be asked (without overloading Joe with too much too quickly), are whether he has had any diabetes education, what he understands about blood glucose targets and when his last eye examination and urine test (for measurement of his albumin to creatinine ratio) occurred. Also does he smoke or drink alcohol, and if so, how much? Also does he have symptoms of hyperglycaemia – does he get thirsty often, does he pass urine overnight and, if so, how many times, does he get a dry mouth, does his vision get blurry and does he feel fatigued? Does he know what is a generally appropriate diet and exercise regimen for people with type 2 diabetes? If he has reduced feeling in his feet, is he aware that he should not go barefoot and does he check his feet each day for blisters and look for areas that could lead to ulcers or infection?

In the physical examination, you should check Joe's feet for evidence of peripheral neuropathy, skin or nail abnormality, foot deformity or peripheral arterial insufficiency. You should also check his blood pressure (bearing in mind the consultation has been stressful for him).

Joe works as a captain on a tourist boat. He is divorced (happily, he says) and has two children living in other states of Australia. He fishes but has no other hobbies, he does not exercise, he socialises with the crew on the boat and at the end of the day they 'throw a few beers back' (specifically, on questioning, this is about six cans most days). He stopped smoking five years ago. Joe says he knows he has diabetes but he does not understand diabetes and thought 'the tablets would mainly take care of it'. He is quite unaware of the rationale for screening for complications of diabetes and no doctor has ever mentioned any routine regular care regarding it.

On your specific questioning he does not appear to be overtly symptomatic of hyperglycaemia, passing urine once overnight only and not being notably thirsty. He does consume at least 3 litres of sugary soft drink daily and has some mild fatigue. He is unsure if he snores or has episodes of apnoea, and reports generally good libido. On further examination, he has no evidence of peripheral neuropathy or other foot problems and his blood pressure is 148/86 mmHg in the left arm when seated.

What pathology tests do you order for Joe?

Answer: To help provide some immediate feedback, it would be helpful to carry out a capillary blood glucose measurement in the surgery (but in reality you may not have time given the length of the consultation). Joe also needs to have up-to-date measurements of his fasting cholesterol, triglyceride, high- and low-density lipoprotein and fasting blood glucose levels, as well as urea, electrolyte and creatinine levels and a glycosylated haemoglobin (HbA_{1c}) level. He should also have a full blood count and liver function tests. As he has been on metformin for some time he should have his vitamin B_{12} level measured (as metformin is associated with deficiency of vitamin B_{12} via reduced absorption). He should also provide an early morning midstream urine sample, after showering, for measurement of urinary albumin to creatinine ratio.

Joe is now concerned about the issue of diabetes control and his ability to hold a licence to captain a public tourist vessel. How does Joe's diabetes legally impact on his ability to hold this licence?

Answer: From a blood glucose perspective, Joe is legally allowed to captain the vessel as long as he does not suffer severe hypoglycaemic episodes. His HbA_{1c} level is also required to be under 9.0%. He would not, however, be allowed to captain this vessel if he were to require insulin.

Joe returns for review after two days for the results of his pathology tests. His HbA_{1c} is 12.2% (general target is under 7.0%), his formal fasting blood glucose level is 31.0 mmol/L (fasting level should be under 5.5 mmol/L), and his full blood count, electrolytes and creatinine to albumin ratio are all normal. His urea level is raised at

Practice points

- Always consider a patient's social history and occupation in the setting of their diabetes.
- Consider and investigate for general medical conditions that may contribute to a patient's presenting problem.
- Generally assess each patient who has hyperglycaemia to determine their degree of dehydration and cognitive impairment and thus the need for acute in-hospital care. If in doubt, refer the patient to the emergency department.
- Promptly manage hyperglycaemia with combined diet and medication approaches where indicated.
- Do not assume patients with diabetes understand their condition or have been educated about it. Always ask them about this and use the allied health team and specialist services where needed.
- Timely tertiary healthcare team support, such as the endocrinology registrar on call and the local diabetes centre, including through phone contact, can help determine clinical review and care priorities in challenging clinical care situations.

11.0 mmol/L (normal 4.0 to 8.0 mmol/L) and so is his creatinine level at 145 µmol/L (normal under 90 µmol/L). His estimated glomerular filtration rate is 85 mL/min/1.73 m^2. His bicarbonate level is normal, reflecting no major acid-base disturbance. His liver function tests and lipid levels both show a similar picture as two year ago. His vitamin B_{12} level is mid-normal at 350 nmol/L.

Joe says that other than having some ongoing fatigue he feels quite well although his vision bilaterally is a little blurred. On careful examination he appears mildly dehydrated; he says he is having no problems eating and drinking. Joe is now quite agitated about losing his job and being under financial distress. He cannot afford time off work and says he needs to be able to go back to work, ideally today, for job security.

What do you discuss with Joe about management at this stage?
Answer: You tell Joe that although he feels generally well, his blood glucose levels are very high. You counsel him about the need to promptly and safely reduce his blood glucose level before he can return to work.

You telephone the endocrinology registrar on call at the local hospital and after discussing Joe's case, you prescribe Joe a second oral hypoglycaemic agent, gliclazide modified release 60 mg in the morning, in addition to his 1 g metformin daily. His balanitis is settling and you advise him to continue his antibacterial and antifungal therapies.

What do you do next?
Answer: You refer Joe to the local hospital (urgently), with a referral letter incorporating the test results and specifically Joe's concerns about his job. Even though Joe does not appear to be cognitively impaired, he should not drive to the hospital as he may have difficulty responding quickly to avoid an accident. You advise Joe that he is not able to return to work later today. You tell him that he is unlikely to be admitted into hospital and reassure him that with their guidance on a change in diet and medication adjustment, his blood glucose level should be stable enough for him to return to work very soon. Often by removing sugary drinks, blood glucose levels improve in hours to days. You tell him you would like to see him again the week after he has been seen in the hospital.

Outcome: Joe was seen the same day by the endocrinology registrar at the local hospital, due to your direct telephone communication with her and because of Joe's anxiety about his job. Joe also sees the diabetes nurse educator and is given information about his condition. He has also seen the dietitian at his local diabetes centre. His blood glucose levels are being monitored and are now under 18 mmol/L postprandially, and his fasting blood glucose level is under 10 mmol/L, without symptomatic hypoglycaemia. Joe has been told his blood glucose levels will continue to normalise over subsequent months with diet change and exercise. The gliclazide is changed to sitagliptin 100 mg in the morning to help minimise his risk of hypoglycaemia. He has also been commenced on atorvastatin 20 mg with the aim of increasing the dose to 40 mg after several weeks if he tolerates it.

Joe returned to see you two weeks later for a diabetes management plan and allied health referral form for further sessions with a diabetes educator and dietitian and for podiatry review. He is now back at work and has stopped drinking alcohol and is avoiding sugary-based soft drinks and large volumes of fruit juice. He ensures his blood glucose level is above 5 mmol/L to drive. His blood pressure is now below the RACGP target of 130/80 mmHg and his eye examination was normal. Following your review he has agreed to see you in two months, and then every three to four months for monitoring to check the HbA_{1c} target is being maintained, as well as his lipid levels, blood pressure and lifestyle changes. **ET**

COMPETING INTERESTS: None.