

Case 1

You are asked to see a 57 year old 70Kg gentleman on the ward who has been in hospital for 2 days and is being treated for ascending cholangitis. Earlier in the day he had a failed ERCP for a stone in the common bile duct. The nurse is concerned regarding his low urine output.

Q1: What is your approach to managing this patient?

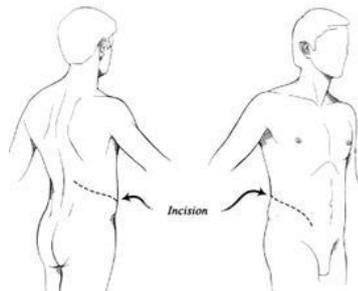
Q2: How do you define oliguria?

A1:

- Assess ABC
- Brief history and examination including PMHx
- Review drug chart including acute prescriptions and regular medications
- Review fluid and input/output chart
- Ensure patient is catheterised and check catheter is not blocked
- Further investigations and management based on above.

A2: Oliguria is defined as a urine output of less than $0.5\text{mL.Kg}^{-1}.\text{hr}^{-1}$

On examination he is alert, with a BP of 92/64 mmHg, HR 78 bpm, RR 28, oxygen saturation of 96% on room air and a temperature of 38°C . He has warm peripheries. On examination of his back you see the following scar:



His drug chart shows atenolol 50mg OD and lisinopril 10mg OD. He has been commenced on IV piperacillin-tazobactam and gentamicin for his infection.

His urine output has been $10\text{mL}.\text{hr}^{-1}$ for the last two hours.

Q3: What are your next steps in this gentleman's management?

Q4: Will his previous surgery affect your management?

A3:

- Stop antihypertensive medications. Review gentamicin dosing and levels.
- Bladder scan / flush catheter to exclude lower urinary track obstruction
- Intravenous fluid challenge
- Blood tests including haematology, biochemistry
- Septic screen including blood and urine cultures
- ABG
- USS renal tract to rule out urinary obstruction

A4: Previous possible nephrectomy necessitates prevention of irreversible injury to the remaining kidney.

Q5: What are this gentleman's risk factors for developing acute kidney injury?

A5: Likely severe sepsis, hypovolaemia, gentamicin and ACE inhibitor therapy and possibly a previous nephrectomy.

His bloods show a Cr 429 micromol.L⁻¹ and Ur 25.7 mmol.L⁻¹. His ABG performed on breathing room air is shown below:

pH	7.24
PaCO ₂ , kPa	3.5
PaO ₂ , kPa	12
Standard HCO ₃	12
BE	-10
Na	132
K	6.4

Q6: How would you proceed to manage the most important abnormality in these results?

A6: Treat hyperkalaemia:

- Cardiac monitoring and 12 lead ECG
- 10mL 2.2% calcium gluconate urgently
- 50mL 50% dextrose IV with 10 IU short acting insulin
- Repeat blood tests for renal function in 1 hour
- If potassium still high – can repeat insulin/dextrose. Consider salbutamol nebulisers.

Q7 What other management priorities are there?

A7 Consider central venous catheter if urine output not improving with IV fluids +/- higher level monitoring in a high dependency area.

Q8: What are the indications for renal replacement therapy?

A8: Indications for RRT include:

- Persistent anuria
- Hyperkalaemia: persistently > 6.5 mmol.L⁻¹ or ECG changes or arrhythmias observed
- Severe acidaemia: pH < 7.20
- Raised serum urea: >30 mmol.L⁻¹ or clinically uraemic/azotaemic
- Refractory fluid overload
- Uraemic complications – encephalopathy, pericarditis, neuropathy or myopathy
- Rare uses – management of cytokine storm, temperature control, drug overdose

Q9: What do you understand about the difference between haemodialysis and haemofiltration?

A9: **Haemodialysis:** Small molecular weight solute equilibrates between a blood compartment and a dialysate compartment separated by a semipermeable membrane, down a concentration gradient (diffusion).

Haemofiltration: Uses a hydrostatic gradient to drive plasma through a semipermeable membrane in larger volumes. Water and solute are then replaced from a separate source to replace the filtered components and the filtrate is discarded (convection, 'solvent drag'). Haemofiltration is more cardiovascularly stable, and is therefore usually used preferentially in the critically ill patient.

Q10: What would be the definitive management of this gentleman?

A10: Urgent biliary drainage via percutaneous transhepatic cholangiogram by an interventional radiologist.

Source control and early antibiotics are pivotal in the management of this gentleman's severe sepsis.

Refer to the Surviving Sepsis Guidelines

Q11: What can you tell me about the RIFLE criteria?

A11: RIFLE criteria proposed by the Acute Dialysis Quality Initiative (ADQI) group to aid the staging of patients with AKI.

The classification uses either the serum creatinine, Cr, (as an indication of the GFR) OR the urine output, UO. All serum Cr increase is related to baseline Cr, if known.

Risk: GFR decrease by >25% or Serum Cr increased 1.5 times OR UO <0.5 mL.Kg⁻¹.hr⁻¹ for 6 hours

Injury: GFR decrease by >50% or Serum Cr doubled OR UO <0.5 mL.Kg⁻¹.hr⁻¹ for 12 hours

Failure: GFR decrease by 75% or Serum Cr tripled or >355 umol/l or UO <0.3 mL.Kg⁻¹.hr⁻¹ for 24 hours

Loss: Persistent AKI or complete loss of kidney function for more than 4 weeks

End-stage renal disease: Complete loss of kidney function for more than 3 months.