**Case Report:**

**Intensive care management of the HELLP syndrome**

M E McBrien, D L Coppel

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In 1982 Weinstein reported a syndrome in pregnancy characterized by haemolysis, elevated liver enzymes and low patelet count, the HELLP syndrome, and described it as a severe consequence of pre-eclampsia. Patients may present with a wide variety of signs and symptoms but evidence of pre-eclampsia may not be present. Multisystem failure may occur due to widespread microcirculatory dysfunction. This case demonstrates the range of supportive therapy required in the intensive care management of such patients.

**CASE REPORT.**

A 26 year old primigravid woman was admitted to the intensive care unit (ICU) following Pfannensteil laparotomy for suspected concealed post-partum haemorrhage 4 hours after Barnes Neville forceps delivery for fetal distress. No bleeding point was identified and the patient was transferred ventilated to the intensive care unit as she remained hypotensive and oliguric. A central venous line had been inserted in theatre and a dopamine infusion commenced at 5 μg/kg/min.

The only problem in pregnancy had been a mildly elevated diastolic blood pressure (90-95 mmHg) at 39 weeks with no proteinuria or oedema, but when spontaneous labour was established one week later the blood pressure had returned to normal (125/85 mmHg).

The patient had complained of epigastric pain two hours prior to delivery and this persisted intermittently into the post partum period. Blood pressure measurements were normal throughout labour but 30 minutes following delivery she developed hypotension which responded initially to the administration of intravenous fluids. Blood cultures were taken prior to the administration of intravenous antibiotics due to the development of a pyrexia of 38.4°C. Full blood count and coagulation profiles at that time showed haemoglobin 7.0 g/dl, white cell count 30 x 10⁹/l, platelets 37 x 10⁹/l, prothrombin time 28 seconds (normal 12-17 seconds), activated partial thromboplastin time 93 seconds (normal 29-40 seconds) fibrinogen 1.67 g/l (normal 2-5 g/l) and fibrinogen degradation products >10<40 μg/ml (normal <10 μg/ml). Ultrasound scan of the abdomen revealed a small amount of intraperitoneal fluid and the decision was taken to proceed to laparotomy.

On arrival in ICU the patient was noted to be oozing a considerable amount of blood from the Pfannensteil incision. She had marked oedema of her face, hands and legs which, in addition to the history of epigastric pain associated with a low haemoglobin and platelet
count and coagulopathy, suggested the diagnosis of HELLP syndrome. An urgent
biochemistry assay showed AST 6234 U/L (normal 10-40 U/L), alkaline phosphatase
93 U/L (normal 35-120 U/L) and bilirubin 61 µmol/L (normal 3-18 µmol/L). As the patient
was bleeding profusely from the abdominal incision and requiring large amounts of blood
and clotting factors no evidence of haemolysis was sought.

The patient’s problems in ICU can be summarized as follows:-

1. Coagulopathy and haemorrhage
During the first three days in ICU the patient continued to have major haemorrhage from
the abdominal incision in the presence of a worsening coagulopathy that showed the initial
features of disseminated intravascular coagulation. Her requirements for blood and blood
products during that time and during the whole of her stay in ICU are shown in table I.
Antifibrinolytic therapy with aprotonin and tranexamic acid was employed in an attempt
to reverse the process but with no apparent success. On day three a repeat laparotomy was
performed and, although no bleeding points were identified, heavy packs plus further
administration of coagulation products resulted in cessation of the bleeding. Episodic
vaginal bleeds of 500-1000 mls occurred repeatedly over the next three weeks despite
normal coagulation profiles. On day 25 an abdominal hysterectomy with left salpingo-
oophorectomy was performed with complete cessation of bleeding.

| Table I |
| --- |
| Blood and blood products received in the intensive care unit |

| TOTALS | 72 hours | next 32 days |
| --- | --- | --- |
| red cell concentrate | 42 units | 33 units |
| fresh frozen plasma | 38 units | 17 units |
| cryoprecipitate | 10 units | |
| platelets | 50 donors | |

2. Cardiovascular instability
A pulmonary artery floatation catheter was inserted on admission to ICU as the patient
remained hypotensive despite what appeared to be adequate fluid replacement and a CVP
reading of +10 mmHg. Subsequent measurements revealed pulmonary capillary wedge
pressure 11 mmHg (normal 5-12 mmHg), systemic vascular resistance 550 dynes/cm²
(normal 950-1300 dynes/cm²) and cardiac output 9.01 min (normal 4-6 l/min). Infusions
of noradrenaline and dobutamine were therefore commenced but it was possible to
discontinue these within 48 hours while maintaining the dopamine at 3 µg/kg/min.

3. Acute renal failure
The patient rapidly became anuric despite adequate central and arterial blood pressures and
the administration of frusemide and dopamine. Haemodialysis was initiated on day two,
because of an elevated plasma potassium level of 6.8 mmol/L, and continued daily for the
next three weeks. There was gradual recovery of renal function with subsequent polyuria
and return to normal biochemistry.

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4. Infection
The patient was initially commenced on broad spectrum antibiotics. However all blood and urine cultures were negative. Over the first 10 days there were two significant episodes of pyrexia and leucocytosis. A CT scan of the abdomen and pelvis on day nine showed a very large liver with areas of necrosis but no focal collections. A subsequent examination under anaesthesia revealed no palpable pelvic abscesses but it was possible to incise and drain a large right sided paravaginal haematoma which resulted in a reduction in temperature and leucocytosis.

5. Deranged liver function
Biochemical analysis showed hepatocellular dysfunction with hyperbilirubinaemia (peak 450-500 umol/L) which gradually subsided as the patient’s condition improved. Hepatitis B and C serology were negative. An infusion of 50% dextrose was required initially to treat persistent hypoglycaemia but this gradually resolved. On discharge from ICU the patient’s bilirubin, AST and alkaline phosphatase levels had all returned to within their normal ranges.

6. Ventilatory requirements
The patient remained ventilated for six days until there was control of her multisystem disorder. Her inspired oxygen requirements were never greater than 50%.

7. Nervous system
An isolated seizure occurred on day 30 and phenytoin therapy was commenced.

The patient was discharged to the ward on day 35 and returned home 10 days later with her baby who was successfully resuscitated at the time of delivery.

DISCUSSION
Intensive care physicians may be required to treat patients with HELLP syndrome when one or more organ system failure has occurred. These patients may present at any time in pregnancy with 30% occurring in the post-partum period. Maternal mortality from the condition ranges from 0-24%. Weinstein proposed that the HELLP syndrome described a unique group of patients with severe pre-eclampsia. However, a series of 6 cases has been reported with the features of HELLP syndrome in whom hypertension and proteinuria were absent. The most common presenting symptoms in affected patients are right upper quadrant or epigastric pain (65%), nausea or vomiting (36%) and headache (31%). Patients with HELLP syndrome may be mistakenly diagnosed as having various surgical and medical disorders. In an attempt to improve diagnostic accuracy criteria for the condition have been proposed and are shown in table II.

The pathophysiology of HELLP syndrome is thought to be similar to that of pre-eclampsia with vasospasm and endothelial lesions within multiple organ systems. Platelet consumption occurs by adherence to the endothelial lesions within the microcirculation. The fibrin network produced results in occlusion of the small vessels, organ malperfusion and further activation of the coagulation system. In the liver, occlusion of vessels may result in congestion, ischaemia and necrosis, subcapsular haemorrhage or even rupture. Upper abdominal pain occurs as a result of liver distention. Renal failure may occur due to damaged microcirculation in the kidneys or as a result of intravascular volume depletion secondary to leakage of plasma from the damaged systemic microcirculation.
TABLE II
Criteria for HELLP syndrome

|   |   |
|---|---|
| 1. **Haemolysis** |   |
|   | abnormal peripheral blood film |
|   | total bilirubin $> 1.2$ mg/dl ($\approx 14$ µmol/l) |
|   | lactate dehydrogenase $> 600$U/l |
| 2. **Elevated liver enzymes** |   |
|   | aspartate aminotransferase $> 70$U/l |
|   | lactate dehydrogenase $> 600$U/l |
| 3. **Low platelets** |   |
|   | platelet count $< 100\,000$ mm$^3$ |

The microangiopathic haemolytic anaemia that is the hallmark of HELLP syndrome is thought to result from the passage of red blood cells through small blood vessels with damaged intima and fibrin mesh deposits.\(^4\) Disseminated intravascular coagulation (DIC) was suspected or manifest at delivery in all 18 patients with HELLP syndrome investigated by Van Dam et al.\(^6\) The laboratory criteria of DIC were found to correspond with the degree of organ dysfunction.

The intensive care management of patients with HELLP syndrome producing multiple organ system failure consists of careful monitoring with active and supportive treatment of any complications, as demonstrated in this case. Coagulopathy and haemorrhage require aggressive replacement with blood and clotting factors. In patients in whom hypertension is predominant a high systemic vascular resistance (SVR) may be expected and intravenous vasodilators required. This patient had a low measured SVR with no hypertension and noradrenaline was initially required.

Intervention with renal dialysis may be required early in the presence of hyperkalaemia due to the massive intravascular haemolysis and accompanying renal failure. Even with prolonged renal support there was gradual return of urine production and eventual biochemical homeostasis by the kidneys in this patient.

Hepatobiliary complications secondary to the HELLP syndrome may require surgical intervention.\(^5\) In particular, subcapsular liver haematomas may need to be evacuated and sudden collapse may occur due to hepatic rupture requiring urgent laparotomy. Areas of hepatic necrosis were noted on CT scan in this patient but surgical intervention was not required. The main problem related to hepatic failure was persistent hypoglycaemia which has previously been reported in association with the HELLP syndrome.\(^7,8\)

Adult Respiratory Distress Syndrome has been reported to occur as a result of the HELLP syndrome.\(^3\) Although this patient initially required ventilatory support the $F_1O_2$ was never greater than 0.5 and ARDS did not occur. One feature to note with these patients is that laryngeal oedema may be present and intubation may prove difficult. Two out of the four deaths in a review of 442 cases by Sibai were as a result of cerebral hypoxia secondary to failed intubation.\(^3\) Difficult intubation must be predicted and the ability to provide an emergency surgical airway must be available.

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It has been suggested that exchange plasmapheresis with fresh frozen plasma may be beneficial in patients with persistent thrombocytopenia. The mechanism of action of such intervention is not clear and, as this is an invasive and expensive procedure, its use in such patients should await the results of a randomised trial.

Seizures may occur at any time due to associated eclampsia. The isolated generalised convulsive seizure in this patient occurred on day 30 and was probably unrelated to the presenting disorder and more likely due to uraemia or ciprofloxacin therapy.

This case highlights many of the problems encountered in the intensive care management of patients with the HELLP syndrome. Obstetricians and intensive care physicians must be aware of the condition and consider it in the differential diagnosis of critically ill patients during pregnancy and the peripartum period.

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