Case -1

A 40-year-old housewife complained to her GP of generalised severe itching during the previous 9 months. She had no other symptoms, and she said that her alcohol consumption was small (2–3 U/week). On clinical examination, she was slightly jaundiced, and bilirubin was detected in the urine. The results of liver function tests were as follows:

**Serum Result Reference range**

Albumin 38 35–50 g/L

ALP activity 450 40–125 U/L

|  |  |  |
| --- | --- | --- |
| **Serum** | **Result** | **Reference range** |
| ALT activity | 60 | 10–50 U/L |
| Bilirubin, total | 60 | 3–16 μmol/L |
| GGT activity | 150 | 10–55 U/L |

**Comments:** This patient has cholestatic jaundice. Her pruritus is caused by the retention of bile salts. The presence of serum anti-mitochondrial antibodies in high titre indicated that the diagnosis was primary biliary cirrhosis, one of the causes of intrahepatic cholestasis. Retention of bile salts within the liver is liable to cause hepatocellular damage, which could account for the increased serum ALT activity in this patient.

Case -2

**Bilirubin and urobilinogen measurements (examples of results in various conditions).**

**Urine tests (side room) Serum [bilirubin]**

**condition Urobilinogen Bilirubin Total\* (μmol/L) Conjugated**

Healthy individuals Trace **Nil** 2–17 About 5% Gilbert’s syndrome Trace Nil <50 Below 5% Haemolytic diseases Increased Nil <60 Below 5%

Hepatitis

Prodromal Increased Detectable <35 Raised Icteric stage Undetectable Present <250 Much raised Recovery stage Detectable Falling Falling Falling

Biliary obstruction Undetectable Present <400 Much raised

\*Values for serum [total bilirubin] are included so as to give indications of the order of severity of the hyperbilirubinaemia that may be observed in the various conditions listed. be observed in the various conditions listed.

Case-3

A 13-year-old boy was taken by his mother to see the GP because he had been feeling hot for the previous 2 days and had been complaining that his muscles ached. He had eaten little for the previous 2 days. On examination, the doctor found that the boy was pyrexial (38.4 °C) and appeared jaundiced.

There was no abdominal pain or tenderness, lymphadenopathy or enlargement of the spleen or live Urobilinogen was within normal limits in urine, and there was no detectable bilirubin in the specimen. The doctor requested liver function tests, which were as follows:

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| --- | --- | --- |
| **Serum** | **Result** | **Reference range** |
| Albumin | 45 | 35–50 g/L |
| ALP activity | 180 | 40–125 U/L |
| ALT activity | 30 | 10–50 U/L |
| Bilirubin, total | 60 | 3–16 μmol/L |
| GGT activity | 35 | 10–55 U/L |

Five days later, the boy had recovered. He had no fever and his jaundice had gone, but serum [bilirubin] was still elevated at 30 μmol/L, as was the ALP activity at 175 U/L. The reticulocyte count and other haematological investigations had all been normal on both occasions. What is the most likely diagnosis, and how would you explain the abnormal results among the liver function tests?

**Comments:** This patient has Gilbert’s syndrome. This was revealed when he developed a flu-like illness and went off his food. Caloric restriction in these patients can be used as a test to unmask the latent milhyperbilirubinaemia. The absence of bilirubin in the urine showed that the hyperbilirubinaemia was due to increased plasma [unconjugated bilirubin], and the normal reticulocyte count excluded haemolytic anaemia as the cause.

The raised ALP activity was of bone origin, expected in a child of this age entering puberty when there is rapid bone turnover. The serum GGT activity was normal, which helped to confirm this explanation.

Case-4

A GP was called to see a 21-year-old female student who had been complaining of a flu-like illness for 2 days. The illness had become worse, with symptoms of fever, vomiting and abdominal tenderness in the right upper quadrant. On

examining the patient, the doctor found that she was pyrex and jaundiced. The liver was enlarged and tender. On questioning her, the doctor found that she had recently returned from a long holiday in Asia.

A sample of urine appeared dark, and bilirubin was present and urobilinogen was increased. A blood sample was taken for liver function tests, the results of which were as follows:

|  |  |  |
| --- | --- | --- |
| **Serum** | **Result** | **Reference range** |
| Albumin | 40 | 35–50 g/L |
| ALP activity | 190 | 40–125 U/L |
| ALT activity | 560 | 10–50 U/L |
| Bilirubin, total | 110 | 3–16 μmol/L |
| GGT activity | 60 | 5–35 U/L |

What is the most likely diagnosis?

**Comments:** The results and presenting features are characteristic of hepatitis caused by an infective agent. The presence of bilirubin in the urine showed that there was a conjugated hyperbilirubinaemia, and the markedly elevated serum ALT activity and increased urinary urobilinogen indicated that the jaundice was hepatocellular in origin.

Both serum ALP activity and GGT were slightly elevated, indicating that there was some degree of intrahepatic cholestasis.

Possible causes could include hepatitis A, B, C, Epstein–Barr virus, etc. In this case, the serum contained a high titre of antibodies to hepatitis A.

Case-5

A 68-year-old retired labourer presented complaining of loss of weight, tiredness and loss of appetite. He had lost 19 kg during the previous 3 months, but had been eating normally up until 3 weeks previously. He had experienced no pain, but on questioning admitted to drinking moderately for most of his life. He also stated that he had been passing dark urine for some time and that his stools were quite pale.

The examination showed a tired, thin man with jaundice. There was a palpable mass in the right upper quadrant of the abdomen, with no tenderness. The results of the liver function tests were

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| --- | --- | --- |
| **Serum** | **Result** | **Reference range** |
| Albumin | 32 | 35–50 g/L |
| ALP activity | 632 | 40–125 U/L |
| ALT activity | 55 | 10–50 U/L |
| Bilirubin, total | 90 | 3–16 μmol/L |
| GGT activity | 200 | 10–55 U/L |

Urine analysis showed the presence of bilirubin, and urobilinogen was undetectable. Faecal occult blood was positive. AFP in plasma was not increased. What is the most likely diagnosis?

**Comments:** The pale stools, presence of bilirubin and lack of urobilinogen in the urine, accompanied by high serum activities of ALP and GGT, suggest that the patient has cholestatic jaundice. The abdominal mass and positive faecal occult blood suggest that a tumour of the biliary tract or the pancreas may be responsible. Hepatoma was unlikely, as AFP was negative.

Ultrasound showed a large abdominal mass and dilated intrahepatic and extrahepatic bile ducts. A CT scan suggested that there was a tumour at the head of the pancreas that was obstructing the common bile duct.

Case-6

**Hepatocellular damage and cholestasis (serum measurements that may help to** **differentiate between these conditions).**

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| --- | --- | --- | --- | --- | --- |
|  | **Hepatocellular damage** |  | | | |
| **Investigation** | **Acute** | **Chronic** | **Cholestasis** | **Cirrhosis** | **Tumours** |
| Albumin | N or ↓ | N to ↓↓ | N or ↓ | N or ↓ | N or ↓ |
| Bilirubin (total) | N to ↑↑ | N or ↑ | N to ↑↑ | N or ↑ | N |
| Aminotransferases | ↑↑ or ↑↑↑ | N or ↑ | N or ↑ | N or ↑ | N or ↑ |
| ALP | N or ↑ | N or ↑ | ↑↑ | N to ↑↑ | ↑ |
| GGT | N or ↑ | N or ↑ | ↑↑ | N or ↑ | ↑ |
| Igs N or ↑ ↑‡ ↑† N or ↑\* N | | | | | |
| PT | N or ↑ | N or ↑ | N or ↑ | N or ↑ | N |
| Effect of parenteral vitamin K on PT | None | May correct | May correct | None |  |

N = normal; ↑ = increased; ↑↑ = much increased; ↑↑↑ = very much increased; ↓ = decreased; ↓↓ = much decreased.

N indicates that serum [bilirubin] is often normal when cholestasis is localised, as it often is with secondary deposits in the liver.

\* Serum [IgA] is particularly increased in cirrhosis.

† Serum [IgM] is increased in primary biliary cirrhosis.

‡ Serum [IgG] is increased in chronic active hepatitis.