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Jugular Vein Technique for Serial Blood Sampling in the Hamster.

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Summary

The puncture is performed via the external jugular vein in hamster (100 g) under appropriate anesthesia and will give 1 ml within 30 seconds with certainty and security. Blood volumes up to 1 ml have been obtained once a week for a period of 20 weeks.

Introduction

A variety of methods have been described for obtaining blood samples in laboratory animals: puncture of the orbital plexus[1], cardiac puncture through the chest wall[2], dissection and incision of the femoral artery, carotid artery or jugular vein[2]. There are few reports that refer to blood sampling in hamsters in contrast with that of rats and mice. Concerning hamsters, Grice[3] has recommended the lateral marginal leg vein, orbital plexus for obtaining routine samples and the aorta in terminal experiments. Whitcutt and Singer[4] have mentioned heart puncture in hamsters and the jugular vein following skin incision. For rapid collection of a large volume of blood, cardiac puncture is a good method, but not repeatable for a long period with security and certainty. Using the orbital plexus sometimes damages the orbit or the optic nerve[5]. The jugular vein affords a suitable site for obtaining uncontaminated sequential blood samples and for intravenous injections in rats. Renaud[6] suggested that blood collections and injections using a rat's jugular vein can be made directly through depilated skin, when skin incision is contraindicated, though in fact, he entered the exposed jugular vein after skin incision of the anesthetized animals.

This paper introduces the technique of the jugular venipuncture, developed by Kassel and Levitan[7] for obtaining repeated blood samples from small laboratory animals, and the applicability of this method to hamsters with a modification developed by Renaud[6].

Materials and Methods

Disposable needles (26G x 1/2) and 1 ml tuberculin syringes are suitable. The hamster, anesthetized with ether or barbitulates, is placed on its back with its lower limbs toward the operator. The upper limbs are slightly extended perpendicular to the body axis or left intact and the head is in a straight line with the body. The hair of the neck and upper thorax is wetted by 70% alcohol for

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aseptic. This procedure makes both jugulars visible and palpable over the medial one-third of the clavicle. The needle is introduced 5 mm below the place where the jugular vein is identified and pushed through the pectoral muscle. Thus, the vessel is approached in a caudocephalic direction (Fig. 1) applying suction by the withdrawal of the syringe plugger approximately 0.3 ml. The plugger is then drawn out slowly so as not to collapse the vessel and blood is drawn jnto the syringe. The sample, up to 1 ml is obtained within 30 seconds from each hamster. Hemolysis will not occur if sampling is performed with only moderate suction to avoid damaging the erythrocytes.

In terminal experiments, the samples can be obtained by surgically exposing and severing the jugular vein. This procedure will yield about 4 ml of blood. Intravenous injection is also practicable using this technique (in preparation).

Results and Discussion

Because of our long-standing interest in chemically induced carcinoma in hamsters[8], we measured progressive changes of various clinical biochemical values in serum, such as A/G, total proteins, sialic acid and the so-called "tumor markers", during carcinogenesis experiments in hamsters (in preparation).

As an example of the possible frequency of bleeding, Fig. 3 shows the progressive changes of the serum total proteins (TP), glutamic-oxalacetic transaminase (GOT) and glutamic-pyruvic transaminase (GPT) obtained from the same hamster submitted to carcinogenesis experiment, over a 20 week period. A group of 4 hamsters were painted with a 0.3% dimethylbenzanthracene in

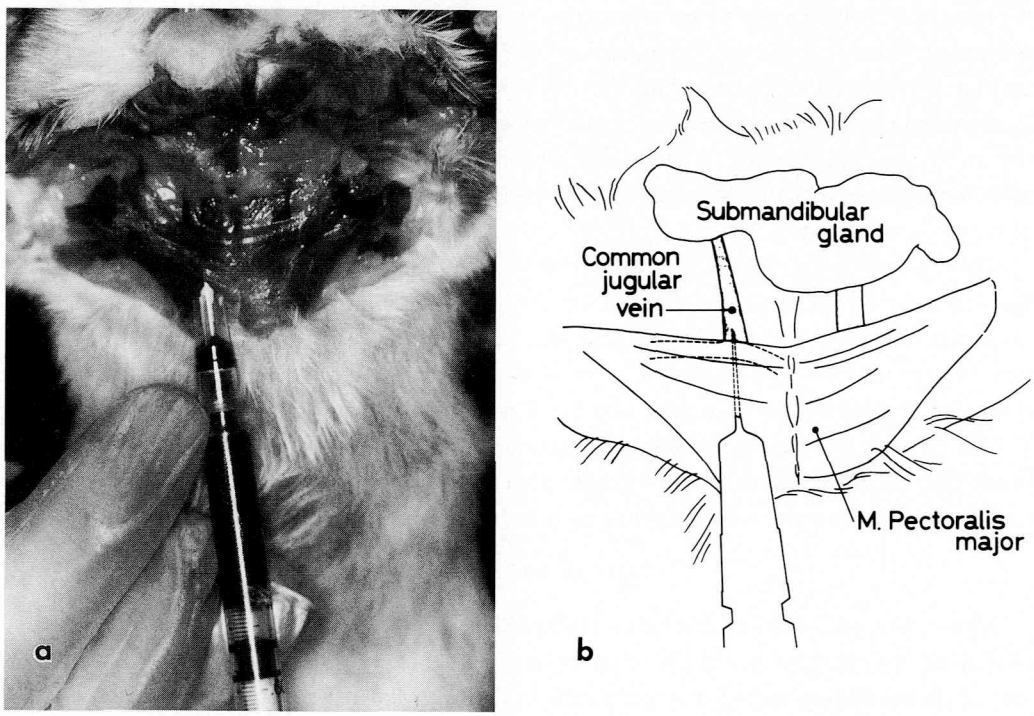

Fig. 1 : Jugular venipuncture : (a) Introduction of needle into external jugular vein. The skin of the neck is dissected to show the position of the vein and the needle. (b) Schematic illustration of (a).

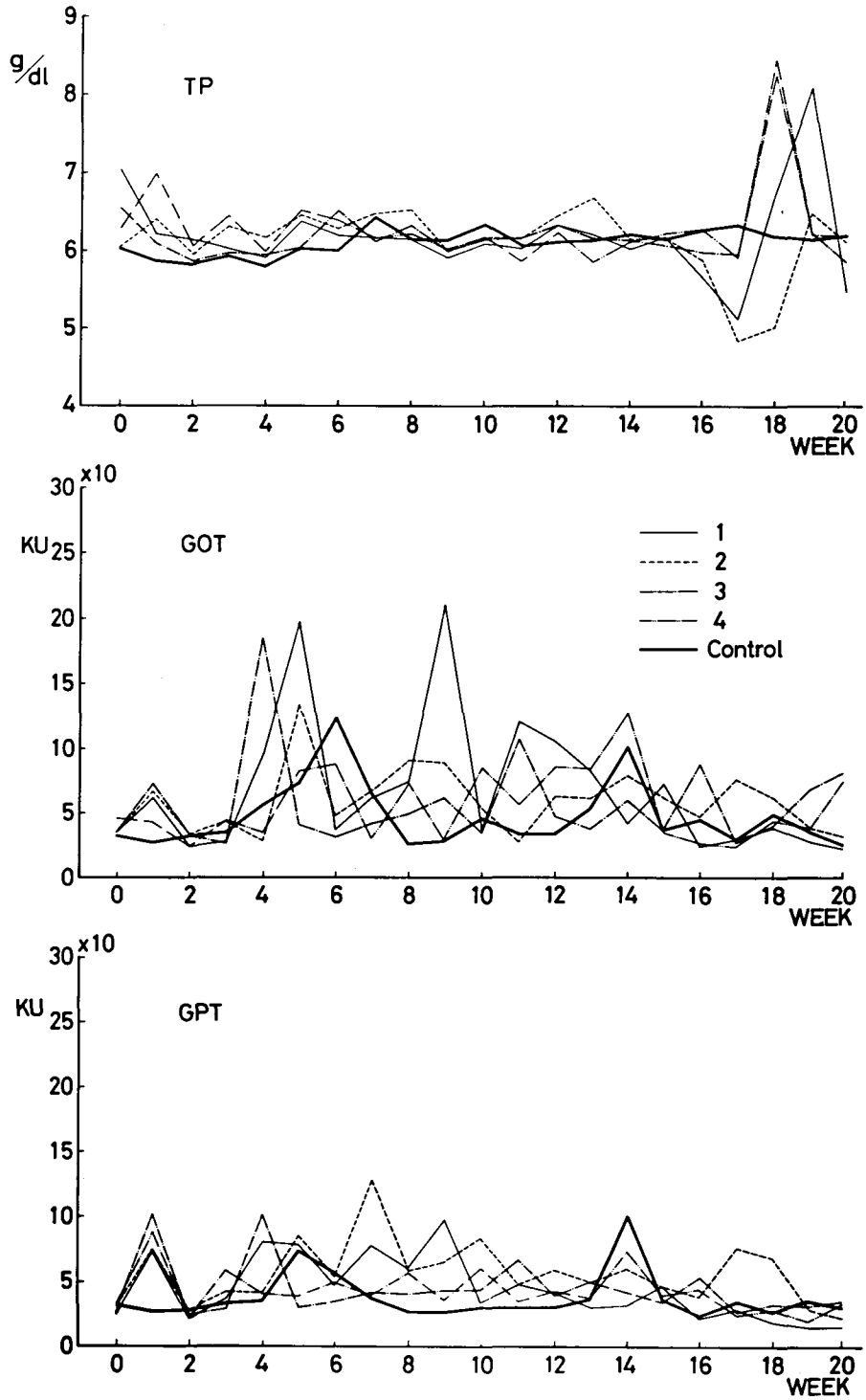

Fig. 2: Sequential changes of total proteins (TP), glutamic-oxalacetic transaminase (GOT) and glutamic-pyruvic transaminase (GPT) values in serum obtained by sampling from individual hamster: Each hamster is bled once a week for period of 20 weeks.

acetone in their cheek pouches, 3 times/week for 14 weeks and left 7 weeks as an experimental group, while another 3 hamsters were followed 20 weeks without treatment as a control group. In this experiment, each hamster was bled 1 ml/once at weekly intervals under ether anesthesia. We have neither observed manifestations of septicemia nor anemia with subsequent loss of animals by this procedure.

It was confirmed that the jugular venipuncture enabled us to obtain blood samples from the same hamster once a week for a period of 20 weeks,up to 1 ml each time, without special instruments, like a device for the fixation of animals. In terminal experiments,samples could be obtained by surgically exposing the jugular vein which yields about 4 ml of blood, which is almost the same volume as that obtained by a heart puncture[9].

We have not experienced an incidental lose of animals with this method per se, thus unnecessary sacrifice of animals can be avoided. This method is easy to learn and a rapid and reliable procedure for blood sampling in hamsters. Like other methods, it requires some training and it is recommended to dissect a hamster during training to learn the position of the vein.

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