A simple procedure to perform intravenous injections in the Mongolian gerbil (Meriones unguiculatus)

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Summary

We describe a simple and feasible procedure for performing intravenous administration of substances in the gerbil. Under light anaesthesia, animals were held in dorsal recumbency and a very small incision of skin, parallel to the femoral vein on the internal side of the thigh, was made. The vein is easily accessible via thin skin incision. An insulin syringe and a 30 G needle were used for the injection. This is an easy and quick method, which, with appropriate anaesthesia, allows rapid recovery.

Keywords  Mongolian gerbil; intravenous injection; femoral vein

The Mongolian gerbil (Meriones unguiculatus) has become a widely-used experimental animal over the last few decades (Diez-Prieto & García-Rodríguez 1999). The difficulty of performing intravenous injections in this species, and the increasing necessity of their use in clinical and experimental practice, makes it essential to search for a suitable injection site.

There are some controversial opinions with respect to appropriate intravenous injection sites in gerbils. Some authors simply state that the sites and procedures useful for rats and mice are also applicable to gerbils (Norris 1987, Harkness & Wagner 1989). Others agree that the lateral tail vein is the most suitable site for injection. As an example, Laber-Laird (1996) indicates that intravenous injections can be applied either in the lateral tail vein or in the saphenous vein. Field and Sibold (1999) mention the possibility of improving the technique of injection in the tail vein by introducing the tail into hot water for 10–20 s to induce vasodilatation. In the same way, many researchers give assurance that this particular site is easily approachable in the gerbil (Harkness 1994), and access is not so difficult as with the hamster, which has a less perceptible tail vein (West 1999).

The jugular (Cuevas et al. 1998) and femoral vein (Shinnou et al. 1998) have also been used in some other studies, but in no case has the procedure been described in detail.

The aim of this article is to describe a simple technique for performing intravenous injections in the femoral vein using a minimally invasive procedure. We wish to provide a feasible technique for researchers who employ the Mongolian gerbil as an experimental animal and need to carry out intravenous injection of a substance.

The procedure we describe has been...
developed as a modification of the method used by Horton et al. (1986), who described femoral venepuncture in the rat.

**Materials and methods**

**Animals**

We used 20 male and 20 female conventional Mongolian gerbils (*Meriones unguiculatus*) with ages ranging from 3 to 8 months and kept in the Laboratory Animal Facility of the University of León. The weight of the males ranged from 62 to 75 g and of the females from 48 to 68 g. They were housed in groups of five on hardwood bedding (Ultrasorb, Panlab, Barcelona, Spain) in solid-bottomed type-III polycarbonate cages (Techniplast, Buguggiate, Italy), in a single room maintained at 22 ± 1°C with a relative humidity of 55 ± 10% and on a 12:12 h light/darkness cycle. They had free access to a rodent maintenance diet (A04, Panlab, Barcelona, Spain) and tap water.

All animal care and husbandry procedures were in accordance with the European Council Directive (1986) and the Spanish Real Decreto (1988) which regulate the protection rules of animals used for experimental and other scientific purposes.

**Anaesthesia and patient preparation**

Induction of anaesthesia was carried out by means of an intraperitoneal administration of a combination of ketamine (Imalgene 500, Merial, France, 75 mg/kg of body weight) and medetomidine (Domtor, Orion Corporation, Finland, 0.5 mg/kg of body weight), using a 25 G needle. The animal was held in dorsal recumbency, with the extremities outstretched and fixed using adhesive tape.

**Intravenous injection technique**

The medial side of the thigh was shaved and sprayed with alcohol. A small incision (0.5 cm) parallel to the vein was made on the skin of the internal side of the thigh (Fig 1). When the buttonhole of skin opens, the femoral vein is visible (Fig 2). The connective tissue, which is very scarce at this level, was withdrawn with no difficulty by blunt dissection to expose the femoral vein. An insulin syringe and a 30 G needle slightly folded were used for the injection (Fig 3). Using this technique we have been able to successfully inject 0.1 to 0.2 ml of liquid.

Once the needle was removed, the site of the puncture was compressed with gauze, in order to avoid bleeding. As soon as the blood

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**Fig 1** Parallel incision with respect to the trajectory of the femoral vein

**Fig 2** The femoral vein is easily visible
flow had ceased, the skin was sutured with 4/0 braided silk thread using single interrupted sutures. After suturing, an antiseptic solution (Betadine®) was applied to the area. A suitable antibiotic should be used to prevent a possible infection but, according to our experience, if the technique is carefully performed an antibiotic is not required.

Anaesthetic recuperation and post-intervention care

Once the process was finished, and not before 30 min after the anaesthetic induction, the antidote against medetomidine (atipamezole, Antisedan, Orion Corporation, Finland) was administered via intraperitoneal injection in the same dose used for medetomidine (0.5 mg/kg of body weight).

It is advisable to place the animal in a warm and quiet place while recovering. It is not necessary to remove the stitches unless they do not fall off by themselves. In this case, which seldom occurs, they should be removed between 7 and 14 days after the procedure, as recommended by Field and Sibold (1999).

Results and discussion

Little information has been published regarding intravenous injection sites in gerbils. Most of the authors recommend the use of the tail vein for drug administration (Harkness 1994, Laber-Laird 1996, Field & Sibold 1999, West 1999). In our experience, the tail vein is quite inaccessible in this species due to the small size of the vessel. Moreover, the pigmentation of the gerbil’s skin does not allow a good visualization of the vein, which results in an unreliable method of injection. In this respect, we agree with the Joint Working Group on Refinement (1993), that this vein is not suitable for venepuncture nor for venesection in this species.

The jugular vein, which has been used by several investigators (Cuevas et al. 1998), has the handicap of being situated near to some vital organs, requires a surgical procedure to carry out the injection and a deeper plane of anaesthesia is needed.

The technique described in this article also requires a surgical intervention but the femoral vein seems to be a more suitable site, since the vessel is easily visualized and it is not situated near any vital structure. Moreover, the operation is quick and easy, and can be performed with a lighter level of anaesthetic.

Thus, although the combination of fentanyl–metomidate seems to be the most reliable general anaesthesia for the gerbil (Flecknell 1998), this short operation does not require a surgical anaesthetic regimen. A medium level of anaesthesia is sufficient. With the combination chosen by us (ketamine–medetomidine), which has also been employed successfully in the mouse (Cruz et al. 1998, Taylor et al. 2000), we have obtained a suitable plane and duration of immobilization, sedation and analgesia, which could not be achieved using ketamine alone.

In the only article mentioned in the literature using the femoral vein in the gerbil, Shinnou et al. (1998) described using the vessel to inject horseradish peroxidase.

In the rat, femoral vein puncture to administer drugs has only been recommended for certain studies requiring acute or chronic catheterization (Kraus 1980). This is due to the need for incising the skin to visualize the vein in this species.

We have determined that the gerbil’s femoral vein is easily visible when the hair of that coat region is removed, and it is approachable even without an invasive procedure.
However, when an irritating drug is to be administered, it is important to avoid any risk of perivascular administration. The best way to make sure that the entire injectate is entering the vein is to expose the vessel, so as to ensure accurate placement of the needle.

The maximum quantity of liquid injected in this study was 0.2 ml, though some authors mention the possibility of injecting doses as high as 0.3 ml in a single intravenous injection (Field & Sibold 1999).

We have not observed any differences during or post intervention either between males and females, or between animals of different ages.

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References


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