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Papers and Articles

Effects of quarantine on cats and their owners

I. Rochlitz, A. L. Podberscek, D. M. Broom

Veterinary Record (1998) **143**, 181-185

The effects of quarantine on 16 cats and their owners were assessed by means of four questionnaires completed by the owners at the beginning of their cat's stay in quarantine, three months later, and two weeks and three months after the cats left quarantine. Changes in body condition were evident in two-thirds of the cats during and at the end of quarantine but not three months later. Mid-way through quarantine, the owners considered their cats were less attached to them, less relaxed, more excitable, more aggressive, more nervous and less playful than before quarantine. When they left quarantine the cats were friendlier, more affectionate and more timid, and three months later they were more affectionate, more nervous and more vocal than before quarantine. When they left quarantine and three months later the cats spent more time with their owners than before quarantine. Most owners visited their cats once or twice a month; the location of the cattery and the limited opening hours restricted the number of visits they made.

THERE is concern about the effects of quarantine on the welfare of animals and on the relationship between pets and their owners (Rochlitz 1994, 1995, 1996, British Medical Association 1995, Rochlitz and others 1995a,b, 1996, RSPCA 1996). The costs of rabies policy, in terms of pet owners' valuations of the anxiety and inconvenience they suffered, and of any detrimental effects on their pets' welfare associated with quarantine, were assessed by Bennett (1997).

The British Medical Association's Guide to Rabies (1995), in discussing the possibility that quarantine may be harmful to animals, states that the number of deaths of animals in quarantine is not higher than the number of deaths in the outside pet population. The major causes of death of cats in the population are road traffic accidents and infectious disease, which together account for over 30 per cent of deaths (Isler and Lott-Stolz 1978, Landes and others 1984, Jonas and others 1986). In quarantine, cats are protected from road traffic accidents, and largely protected from infectious disease; any comparison between the two populations should therefore take into account the differences in mortality risk. The Guide also states 'those in contact with dogs in quarantine suggest that most survive the experience well', but no data are given to support this contention.

In quarantine, domestic cats are housed in a relatively barren environment, and are isolated from people and other animals for six months. The aims of this study were to examine the short- and long-term effects of quarantine on a cat's temperament and behaviour, and on the relationship between the cat and its owner.

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Materials and methods

Four different questionnaires were devised, examples of which can be found in Rochlitz (1997). Open and closed versions of the same questions have been found to generate different types of response, and it is not obvious which format produces the most valid data (Oskamp 1977, Bernard 1994, Foddy 1995). A judicious mix of open and closed questions is generally advised (Foddy 1995), and both open and closed questions were used in the present study.

Eleven owners of 16 cats entering an indoor quarantine cattery were asked to participate in the survey; eight of the cats were housed singly and eight in pairs. The first questionnaire (Q1) was given to the owners at the beginning of their cat's stay in quarantine, the second (Q2) after three months, the third (Q3) within two weeks of the cat's release from quarantine and the fourth (Q4) three months later. Owners were sent the questionnaires, together with a hand-written covering letter asking for their cooperation, at two week intervals, either until they responded or four times; if there was no response after the fourth letter the owner was not contacted again.

The Cochran Q test, the Wilcoxon signed ranks test, Friedman's two-way analysis of variance by ranks and the Spearman rank-order correlation coefficient were used to analyse the data. Because only nine owners of 12 cats completed the final questionnaire, when matched sample comparisons between questionnaires were made only data from these 12 cats were included. The statistical analysis used the software programs Statview SE + Graphics (Abacus Concepts) and SPSS Version 4.0 (SPSS Inc) for the Apple Macintosh.

Results

Demographic and background details

The 11 owners of the 16 cats completed the first questionnaire, 10 owners of 15 cats completed the second, the 11 owners completed the third and nine owners of 12 cats completed the final questionnaire. Nine of the cats came from the European Union, three from North America, three from Asia and one from the Middle East. Nine cats were domestic shorthairs, three were Orientals, three were domestic longhairs or Persian and one was an Egyptian shorthair. Six of the cats were neutered males, eight were neutered females and two were entire females. Their ages ranged from six months to 14 years, with a mean of five years, and a median of three-and-a-half years.

Before their period in quarantine, three of the cats had been confined indoors, and 10 had regularly hunted birds, insects or rodents. Eight of the cats were reported to get on well with other cats, three came from a household with dogs, and only four were reported to get on well with dogs. Two of the cats had been attacked and injured by a dog in the past.

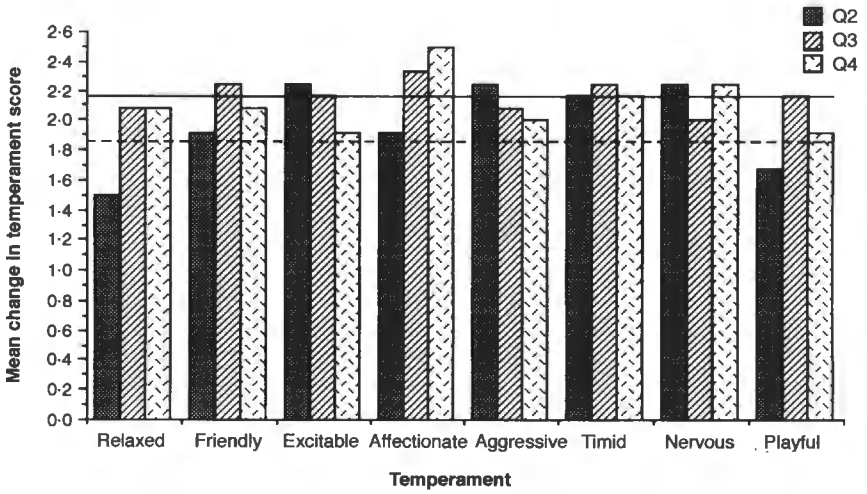

FIG 1: Mean scores for the change in temperament of 12 cats mid-way through (Q2), two weeks after (Q3) and three months after quarantine (Q4). Traits with values above the solid line increased and traits with values below the dotted line decreased in comparison with before quarantine

Body condition

The owners were asked (Q2) if their cat's body condition changed while it was in quarantine. Of the 15 cats for which data were available five had gained weight or had a thicker coat, two had lost weight, and two were described as having lost muscle mass. The owners of these two cats remarked that they seemed to have difficulty in jumping from the floor to raised surfaces in their cage. At the end of quarantine (Q3), 10 of 16 cats showed a change in body condition; seven were fatter or had a thicker coat, one was thinner and two had lost muscle mass. Three months after their release from quarantine (Q4), nine of 12 cats had regained the body condition they were in before quarantine, but two had gained weight and one had lost weight.

The percentage of cats that had changed in body condition, compared with before quarantine, was significantly lower in Q4 than in Q2 and Q3 ($P<0.04$).

Temperament

The owners were asked to record whether, in terms of eight adjectives or traits describing a cat's temperament, their cat had become 'more', stayed 'the same', or become 'less', while it was in quarantine and following release from quarantine. These traits were selected from previous studies on the temperament of cats (Feaver and others 1986, McCune 1992). For a particular trait, if the cat stayed the same it was given a score of 2, if the trait had increased the score was 3 and if it had decreased the score was 1. For each trait, the mean score was calculated to give an index of the direction of change, compared with before quarantine, of the trait mid-way through (Q2), at release (Q3) and three months after the end of quarantine (Q4). Since the score for each cat had a range of 2 (from 1 to 3), a change in the mean score of 0·17 (2/12, because 12 cats were being considered) was interpreted as a change; thus a value more than 2·17 meant that the trait had increased, and a value less than 1·83 meant that the trait had decreased.

Mid-way through quarantine, the cats were described as being less relaxed, more excitable, more aggressive, more nervous and less playful than before quarantine. At release, the cats were friendlier, more affectionate and more timid, and three months later they were more affectionate and more nervous than they were before quarantine (Fig 1).

Vocalisation and interactions between cats and owners

Before quarantine, 11 of the 16 cats miaowed often or occasionally and five miaowed rarely or never (Table 1). Three months after quarantine, the cats were more vocal than before ($P<0.014$); 10 of the 12 cats miaowed often or occasionally. Before quarantine, 15 of the 16 cats played with their owners daily, and 12 were groomed daily or often (Table 1). Three months after quarantine, the frequency of these activities had not changed significantly.

Before quarantine, five of the 16 cats spent less than two hours and 11 spent more than two hours daily closely interacting (being groomed or petted, playing) with their owners (three spent between two and four hours, three spent four to six hours, and five spent more than six hours a day). Fifteen of the 16 cats spent more than two hours daily with their owners after their release, and all 12 did so three months later ($P<0.02$, Fig 2).

TABLE 1: Frequency of vocalisation by cats and interactions between cats and their owners before (Q1) and three months after quarantine (Q4)

Variable	Frequency	Q1 (n=16)	Q4 (n=12)
Vocalisation (miaow)	Often	4 (25%)	6 (50%)
	Occasionally	7 (43·8%)	4 (33·3%)
	Rarely	5 (31·3%)	2 (16·7%)
	Never	0	0
Cat plays with owner	Daily	15 (93·8%)	12 (100%)
	Often	1 (6·3%)	0
	Occasionally	0	0
	Rarely	0	0
	Never	0	0
Cat groomed by owner	Daily	7 (43·8%)	6 (50%)
	Often	5 (31·3%)	3 (25%)
	Occasionally	3 (18·8%)	2 (16·7%)
	Rarely	1 (6·3%)	1 (8·3%)
	Never	0	0

Owner-cat and cat-owner attachment

In each questionnaire the owners were asked to state whether they felt that the strength of attachment of their cat to themselves was stronger, the same, or weaker than it had been before quaran-

TABLE 2: Strength of attachment between cats and their owners mid-way through quarantine (Q2), two weeks after quarantine (Q3) and three months after quarantine (Q4)

Variable	Strength	Q2 (n = 15)	Q3 (n = 16)	Q4 (n = 12)
Cat to owner	Stronger	2 (13·3%)	7 (43·8%)	5 (41·7%)
	Same	9 (60%)	9 (56·3%)	6 (50%)
	Weaker	4 (26·7%)	0	1 (8·3%)
Owner to cat	Stronger	6 (40%)	7 (43·8%)	5 (41·7%)
	Same	9 (60%)	9 (56·3%)	7 (58·3%)
	Weaker	0	0	0

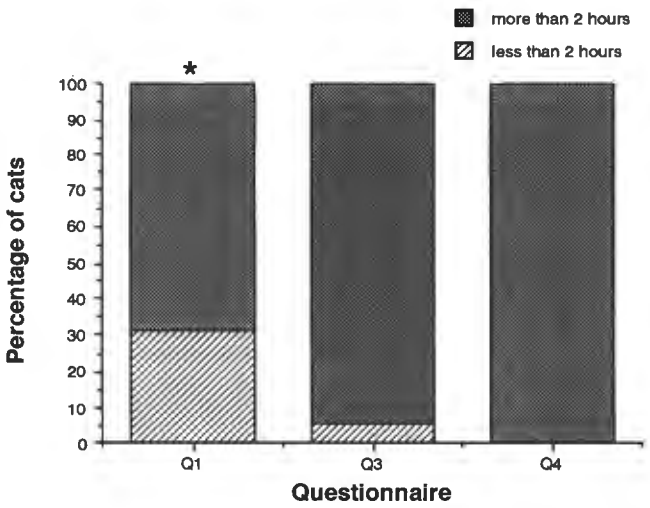

FIG 2: Time spent daily by cats interacting closely with their owners before (Q1), two weeks after (Q3) and three months after quarantine (Q4). * Different from Q3 and Q4 (P<0·02)

tine, and whether they felt the strength of attachment of themselves to their cat had changed (Table 2). During quarantine, two of the 15 cats were described as being more strongly attached to their owner, nine as having the same strength of attachment, and four as being more weakly attached to their owners. At the end of quarantine, seven of the 16 cats were more strongly attached, and the other nine had the same strength of attachment. Three months later, five of the 12 cats were more strongly attached, six had the same strength of attachment and one was more weakly attached to its owners than before quarantine. There were significant differences between the results of the questionnaires (P<0·0008); the data in Q2 were different from the data in Q3 and Q4 (P<0·05). Compared with before quarantine, the cats seemed less attached to their owners during quarantine than at the end or three months after quarantine.

With respect to the strength of attachment of the owners to their cats, there were no differences between the questionnaires. In each case, 40 per cent of the owners felt more attached to their cats, and 60 per cent felt the same.

Adaptation to the new home after quarantine

Owners were asked how long it took for their cat to adapt to its new home after it left quarantine. Four of the 12 cats adapted within one week, four within one month, and one within two months; the other three did not appear to have adapted to their new home three months after their release from quarantine.

Visits to cats in quarantine

Owners could visit their cats every day between 11.00 and 16.00, except on Sundays, Bank Holidays and other holidays. Two of the 11 owners, each owning two cats, visited four to five times weekly, and made over 100 visits to the cattery. They would often bring a chair, blankets and reading material, and spend between 30 and 60 minutes in their cats' cage. One owner visited once weekly, four visited once a month and two visited twice a month. The other two owners visited their cats only twice. Excluding the two owners who visited four to five times weekly, the median number of visits made to the cats during the six months of quarantine was 5·5, and including the two owners, the median was 7. Excluding the two owners who visited four to five times weekly, most visits lasted between 15 and 30 minutes.

All but one of the owners said that they visited less often than they would have liked. The major factors that restricted the number of visits were the location of the cattery and the limited opening hours; other factors included the lack of public transport to the cattery, and the owners' work.

Whether there was an association between the number of visits made to the cats during quarantine and the time taken for them to adapt to their new home after quarantine was investigated by calculating the Spearman rank-order correlation coefficient, r_s (Siegel and Castellan 1988). The r_s value was –0·39, which suggests that there was a weak negative correlation between these two variables (Fowler and Cohen 1995).

Discussion

More than half the cats came from other parts of Europe, and were therefore used to a climate not very different from that found in England. However, four cats came from Asia and the Middle East, and were probably used to a warmer climate.

The ages of the cats ranged from six months to 14 years. In a cattery, the caretakers should be able to adapt themselves to the special requirements of younger and older cats. In very young animals, contact with other animals and with people is important to ensure adequate socialisation (McCune and others 1995). Young cats require more frequent feeding, and need more play and exercise. Young and old cats may have difficulty in negotiating some areas in their cage (for example jumping from the floor to a shelf), and may be less efficient at thermoregulation (Morgan 1990). Older cats are more prone to certain illnesses (Goldston 1995) and should be monitored regularly by a veterinary surgeon or other suitably trained person.

Before they were quarantined, 11 of the 16 cats had access to the outdoors and 10 had hunted regularly. On entering quarantine, they had to adapt to their environment being entirely indoors. Cats confined indoors are isolated from the diverse and constantly changing stimuli in the outside environment, so efforts should be made to provide analogous stimuli indoors. For example, certain grasses are attractive to cats and can easily be grown in small troughs. Strategically-placed shelves encourage exercise and enable the cats to survey their outdoor surroundings from a number of vantage points. To maintain their claws in good condition and to mark their territory cats often scratch on tree bark or wooden posts; suitable surfaces should be provided indoors so that they can express this behaviour. Eight of the cats in this study did not get on well with other cats. Unlike dogs, cats have evolved from a solitary species, and they may find sudden confrontation with other cats stressful (Leyhausen 1979). In the quarantine cattery, the cats were housed in cages next to strange cats; glass partitions dividing the cages meant that the cats were within view of other cats for most of the time. Although this social contact may be beneficial in the long term, cats arriving in quarantine are faced with the challenge of a new environment and with strange cats. Providing hiding places for the cats and covering up the glass partitions for the first few days would enable the cat to investigate and adapt to its new environment before having to confront its neighbours. Cats which fail to adapt satisfactorily to living next to other cats should be identified and housed separately.

Twelve of the 16 cats were not used to dogs, and two had been injured by dogs in the past. In quarantine, it is common practice for dog and cat kennels to be near each other, and in this cattery the cat units were within sight and sound of dogs. This involuntary exposure to dogs is likely to have an adverse effect on cats, particularly in the first few days until the cats learn that the dogs are unable to reach them.

During quarantine and when they were released, changes in body condition were evident in over 60 per cent of the cats. More than 50 per cent of these had gained weight or had a thicker coat (owners could not distinguish between the two). The cats were very inactive during quarantine (Rochlitz 1997) and this was the most likely cause of the weight gain. The temperature in the cat units was quite low, particularly in the spring, autumn and winter months; growing a thicker coat is one of the ways in which the cats could have adapted. Four cats had lost weight or muscle mass. The loss of weight could have been caused by the cats not eating enough to meet their energy requirements, and the loss of muscle by the lack of physical activity. Regular weighing during quarantine would identify cats that require dietary modifications, and would also increase the amount of human contact the cats receive.

The questionnaires showed that there were significant and long lasting effects of quarantine on the temperament of some of the cats. During quarantine, owners reported that their cats were less relaxed, more excitable, more aggressive, more nervous and less playful than before they were quarantined. This assessment was based on the reactions of the cats to their owners during visits, which for most cats were infrequent and short. It would be expected that the cats would be less relaxed and more excited when interacting with their owner infrequently and for short periods, particularly because the amount of human contact the cats received during quarantine was much less than they had been used to (Rochlitz 1997). To compensate for the time spent apart, the owner may tend to interact more intensely and this unfamiliar approach may make the cat more excitable and aggressive. While physically isolated from the normal household environment and receiving little human contact, the cat may have difficulty in coping with the owner's presence and a sudden demand for interaction, and seem more nervous. In the small confines of the cage, it may be difficult for the cat to engage in play with its owner. The changes in temperament recorded during quarantine made owners feel that their cats were less attached to them.

At the end of quarantine, the cats were friendlier, more affectionate and more timid. They were probably attempting to re-establish their relationship with their owners, by seeking out their company and by expressing affection towards them. Their timidity may have arisen because they were having to cope with a new, complex environment, after being isolated in a relatively simple one.

The cats were more nervous three months after their release than before they were quarantined. Isolation in the barren and unchanging environment of quarantine may have reduced their ability to cope when confronted with more complex conditions (Broom and Johnson 1993). They were also more affectionate and more vocal, and five of 12 cats were described as being more attached to their owners than before. Vocalisation is used by cats to attract the owner's attention and to indicate a wish to interact (Mertens and Turner 1988, Bradshaw 1992), and interactions that are initiated by the cat tend to last longer than those initiated by the owner (Turner 1991). Vocalisation may be interpreted by the owner as an expression of affection. The increase in vocalisation, together with the increase in time owners spent with their cats, suggest that the cats were initiating the interactions, but could also have been due to changes in the owner's behaviour. Five of 12 owners felt more attached to their cat, and none said that the strength of attachment to their cat had weakened as a result of quarantine.

In studies published 45 years ago, the psychiatrist John Bowlby examined the reactions of children who were taken into hospital; at that time there was an almost complete absence of contact between parents and their children while the children were in hospital (Robertson and Bowlby 1952, Bowlby 1979). Profound effects were observed, particularly in younger children. Initially they became tearful, crying and calling for their parents and rejecting staff's efforts to mollify and distract them. Later, bored indifference and apathy seemed to take over. Finally, children appeared to recover and to become active once more, but if their stay in hospital was prolonged their relationships with adults and other children appeared to become more superficial and self-centred than before. These three phases were described as the stages of protest, withdrawal and detachment. Feelings of protest re-emerged when the children were reunited with their parents, who were subjected to a mixture of rejection, angry attacks and clinging in the days after the childrens' return from hospital. Some of these changes were long-lived and could be detected up to two years later. As a result of the work by Bowlby and others, the policy of keeping parents away from their children while they were in hospital was changed (Holmes 1993). Similar behavioural changes were observed by Hinde and Spencer-Booth (1971) who studied the effects of separating infant rhesus monkeys from their mothers and peers. In the present study, the changes in the cats' temperament during and after quarantine, when they had been separated from their owners for six months, bear some similarities to those described above and are worthy of further study.

After quarantine, nine of the 12 cats had adapted to their new home environment within two months. Regular visits from the owners during quarantine appeared to reduce the adaptation period after quarantine.

Bennett (1997) found that 95 per cent of owners visited their pets in quarantine from once or twice per month to several times per week. In this study, most owners visited their cats once or twice a month, and said that they would have liked to visit more often. The cattery was in a fairly remote, rural location that was not easily accessible, and most of the owners were working, so it was difficult for them to visit on weekdays during the cattery's opening hours. Because regular visits from owners are likely to be beneficial, the managers of quarantine premises should be required to have more flexible opening hours. Several owners commented that the small size of the cat unit made the visits uncomfortable. There was nowhere to sit down and the units were often cold. Owners of quarantine premises should allow visitors to make modifications to their cat's cage that would make visits more comfortable.

In a survey of pet owners who had placed a pet in quarantine (Bennett 1997), 86 per cent of the respondents said that the period of quarantine was detrimental to their pets' welfare. Most of them stated that they thought their pets suffered stress due to the separation. Ninety-two per cent of the respondents also said that their pets' period in quarantine caused them anxiety; they missed the companionship of their pets and were concerned about their welfare. The present study also observed significant short- and long-term effects of quarantine on the temperament and behaviour of cats, and on the cat-owner relationship. On the basis of these findings, some suggestions have been made for improving the welfare of cats in quarantine, and for reducing the negative effects quarantine may have on cats and their owners.

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Comparison of pethidine, buprenorphine and ketoprofen for postoperative analgesia after ovariohysterectomy in the cat

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Sixty cats which underwent an ovariohysterectomy were randomly allocated into four treatment groups. One group (controls) received no analgesics postoperatively, and the others received either a single dose of buprenorphine (0·006mg/kg) intramuscularly, or pethidine (5 mg/kg) intramuscularly, or ketoprofen (2 mg/kg) subcutaneously. The analgesia obtained after each treatment was assessed by three measures. There were significant differences between the groups both for the requirement for intervention analgesia (P=0·0008) and for the overall clinical assessment (P=0·0003) with ketoprofen requiring least intervention analgesia and having the best overall clinical assessment, followed by buprenorphine then pethidine. The control group required the most intervention analgesia and had the worst overall clinical assessment. Visual analogue scale scoring for pain produced significant differences between the groups from one hour after the operation, with the cats which were given ketoprofen tending to have lower pain scores than the other groups.

THERE is increased awareness within the veterinary profession of the importance of good management of postoperative pain. In addition to being a welfare problem, postoperative pain may increase postoperative complications, delay wound healing, increase wound interference and, possibly, lead to chronic pain (Lascelles and Waterman 1997).

A recent questionnaire to British veterinary practices found that 99·9 per cent of respondents felt that cats were in pain after routine ovariohysterectomy, but that only 26 per cent applied any kind of analgesic intervention. Seventy-one per cent left postoperative pain management in the hands of nursing staff, but 69 per cent felt that their nursing staff had insufficient knowledge about analgesia, and 75 per cent felt that they themselves had insufficient knowledge (Capner and others 1997).

The recognition of pain in cats can be difficult. When they are in pain, cats are generally silent, but they may growl or hiss if approached or stroked, and have a tendency to hide; they have a stiff posture and may sit in a hunched position rather than stretching out (Morton and Griffiths 1985, Sanford and others 1986).

Only a few analgesic drugs are licensed for the control of postoperative pain in cats. They include the partial opioid agonist butorphanol, the opiate pethidine and the non-steroidal anti-inflammatory drug (NSAID) carprofen; pethidine and carprofen were recently compared by Balmer and others (1998). Ketoprofen is licensed for use in the cat as a potent NSAID and antipyretic analgesic, but does not have an indication for use in postoperative pain. Other analgesic drugs are also used despite being unlicensed for use in the cat, for example, morphine, methadone and buprenorphine. Many practitioners prefer not to use opioids, primarily because they are controlled drugs, but also owing to the fallacious belief that opioids cause excitement in cats.

Ideally, an analgesic agent should be administered before surgery to cover both the operation and postoperative period. If analgesics are given before surgery they can have a pre-emptive effect on pain, that is they modulate the noxious inputs to the spinal cord and prevent the sensitisation to pain which normally occurs after surgery; pre-emptive analgesia has been demonstrated in dogs with pethidine (Lascelles and others 1995a) and carprofen (Lascelles and others 1994). Although it can be difficult to demonstrate a pre-emptive effect it is well recognised that it is better to give analgesic drugs before pain is established in order to achieve more effective analgesia (Katz and others 1992, Dahl and Kehlet 1993, Kissin 1996). Good analgesia during an operation also has the benefit of decreasing the requirement for the volatile anaesthetic agent. Postoperative analgesia should give the animal pain relief without unnecessary sedation and should be sufficiently long-acting to cover the whole postoperative period. Unfortunately no one 'magic bullet' satisfies this ideal, and it would probably be more useful to combine local anaesthetic, nitrous oxide, short acting opioids and NSAIDs as part of a balanced analgesic regimen to achieve maximum analgesia with minimum side effects. However, veterinary surgeons still appear to rely mainly on the administration of a single dose of an analgesic rather than to use this approach. This study was therefore designed to investigate the analgesic efficacy of a single dose of a number of different agents, compared with no analgesics.

Materials and methods

Animals

Sixty female domestic short- and longhair cats which underwent ovariohysterectomy between February and June 1996 were included in the trial. The informed consent of the owners was obtained in all cases. The cats were examined clinically to ensure that they were apparently healthy and in ASA category 1. Their ages ranged from five months to five years (mean 14 months) and their mean bodyweight was 2·9 kg (range 1·6 to 3·9 kg).

Anaesthesia and surgery

The cats were given acepromazine (ACP; C-Vet) 0·1 mg/kg subcutaneously, 30 to 45 minutes before the induction of anaesthesia. Anaesthesia was induced with thiopentone (Intraval sodium 2·5

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