Potential behavioural indicators of post-operative pain in male laboratory rabbits following abdominal surgery

MJ Farnworth*†, JK Walker†, KA Schweizer‡, C-L Chuang§, S-J Guild§, CJ Barrett§, MC Leach* and NK Waran†

† Animal Welfare Group, Department of Natural Sciences, Unitec Institute of Technology, Private Bag 92025, Auckland, New Zealand
‡ Royal (Dick) School of Veterinary Studies, University of Edinburgh, Easter Bush Veterinary Centre, Easter Bush, Roslin EH25 9RG, UK
§ Department of Physiology, Private Bag 92019, University of Auckland, Auckland, New Zealand
# Comparative Biology Centre, Medical School, University of Newcastle, Newcastle-upon-Tyne NE2 4HH, UK
* Contact for correspondence and requests for reprints: mfarnworth@unitec.ac.nz

Abstract

This study aimed to identify behaviours that could be used to assess post-operative pain and analgesic efficacy in male rabbits. In consideration of the 'Three Rs', behavioural data were collected on seven male New Zealand White rabbits in an ethically approved experiment requiring abdominal implantation of a telemetric device for purposes other than behavioural assessment. Prior to surgery, rabbits were anaesthetised using an isoflurane/oxygen mix and given Carprofen (2 mg kg⁻¹) as a peri-operative analgesic. Rabbits were housed individually in standard laboratory cages throughout. Data were collected at three time periods: 24–21 h prior to surgery (T1) and, post-surgery, 0–3 h (T2) and 3–6 h (T3). Behavioural changes were identified using ObserverXT, significance of which was assessed using a Friedman's test for several related samples. The frequency or duration of numerous pre-operative behaviours was significantly reduced in T2 and T3, as compared to T1. Conversely, novel or rare behaviours had either first occurrence or significant increase in T2 into T3 as compared to T1, these include 'full-body-flexing', 'tight-huddling', 'hind-leg-shuffling'. We conclude that reduced expression of common pre-operative behaviours and the appearance of certain novel post-operative behaviours may be indicative of pain in rabbits. Behaviours identified as increased in T2 as compared to T1 but not consistently elevated into T3 were considered separately due to the potentially confounding effect of anaesthesia recovery. These included lateral lying, 'drawing-back', 'staggering' and 'closed eyes'. We postulate that for effective application of best-practice post-operative care, informed behavioural observation can provide routes by which carers may identify requirements for additional post-operative analgesia. Additionally, improvement of the peri-operative pain management regimen may be required to ameliorate the immediate effects of abdominal surgery. Comparisons with other studies into post-operative pain expression in rabbits suggest behavioural indicators of pain may differ, depending on housing and surgical procedure.

Keywords: analgesia, animal welfare, behaviour, pain, peri-operative, rabbit

Introduction

Within animal welfare science, the definition of pain continues to be revised, including considerations of the mechanistic and direct nature of pain as well as its psychological and emotional impacts (Merskey 1993; IASP 1994; Molony 1997). However, irrespective of the prescribed definition, it is widely accepted that pain negatively affects quality of life (Grape & Tramer 2007). Pain has been shown to cause behavioural changes across a range of species (squirrel monkey [Saimiri sciureus]: Azrin et al 1964; goats [Capra hircus]: Dobromylskyj et al 2000a; dogs [Canis familiaris]: Holton et al 2001; rats [Rattus norvegicus]: Roughan & Flecknell 2003; Muscovy ducks [Cairina moschata]: Gustafson et al 2006; cats [Felis domesticus]: Waran et al 2007; piglets [Sus scrofa]: Moya et al 2008) and cause increases in fear, anxiety and stress (Dobromylskyj et al 2000b). In addition, surgery, and associated pain, may also cause post-operative weight loss (dogs: Holton et al 2001; rats: Roughan & Flecknell 2003; piglets: Melches et al 2007; fish: Cooke & Sneddon 2007) which can complicate recovery. Negative behavioural changes, which may include anhedonic responses (Pereira Do Carmo et al 2009), can persist well beyond time for recovery (Hummel et al 2008) suggesting a long-term psychological impact.

The requirement to manage pain is paramount to safeguard animal welfare. In response to changing attitudes towards pain, analgesia provision in companion animals has increased...