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Effects of Intraperitoneal Administration of Flunixin Meglumine, Metamizole Sodium, Diclofenac Sodium, and Carprofen on Experimentally Induced Intra-Abdominal Adhesion Formation in Rats

Serdar Köklü[1] and Nuh Kılıç[2*]

[1] MSc, Department of Surgery, Faculty of Veterinary Medicine, Adnan Menderes University, 09016 Isikli, Aydin, Turkey
[2] Professor, Department of Surgery, Faculty of Veterinary Medicine, Adnan Menderes University, 09016 Isikli, Aydin, Turkey

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Abstract

Postoperative intra-abdominal adhesions remain a major complication following abdominal surgery and may lead to intestinal obstruction, infertility, chronic abdominal pain, and difficulties during repeat surgical procedures. This experimental study investigated the effects of intraperitoneally administered flunixin meglumine, metamizole sodium, diclofenac sodium, and carprofen on postoperative adhesion formation in a rat cecal abrasion model. Sixty female Sprague–Dawley rats were randomly allocated into six groups including sham, control, flunixin meglumine, metamizole sodium, diclofenac sodium, and carprofen groups (n=10 each). Following standardized cecal abrasion, the treatment agents were administered intraperitoneally immediately after induction of peritoneal injury. Adhesion formation was evaluated macroscopically on postoperative day 10 using the Nair adhesion scoring system. Hematological and biochemical parameters together with tissue hydroxyproline concentrations were also analyzed. All treatment groups demonstrated significantly lower adhesion scores compared with the control group. Metamizole sodium and carprofen produced the most pronounced reduction in adhesion severity. Hydroxyproline concentrations were significantly lower in the carprofen group compared with the flunixin meglumine, metamizole sodium, and diclofenac sodium groups. The findings suggest that intraperitoneal administration of selected NSAIDs may reduce postoperative intra-abdominal adhesion formation and may represent a supportive pharmacological strategy for adhesion prevention.

Key words: Intra-abdominal adhesion, NSAID, Hydroxyproline, Rat, Peritoneal adhesion

[*] **Corresponding Author**: Nuh Kılıç, Professor, Department of Clinical Science, Department of Surgery, Faculty of Veterinary Medicine, Adnan Menderes University, 09016 Isikli, Aydin, Turkey
E-mail: nkilic@adu.edu.tr

Refrences

Akhlaghi, S., Ebrahimnia, M., Niaki, D. S., Solhi, M., Rabbani, S., & Haeri, A. (2023). Recent advances in preventative strategies for postoperative adhesions using biomaterial-based membranes and micro/nano drug delivery systems. *Journal of Drug Delivery Science and Technology, 85*, 104539.

Avsar, F. M., Sahin, M., Aksoy, F., Avsar, F. A., Akoz, M., & Hengirmen, S. (2001). Effects of diphenhydramine HCl and methylprednisolone in prevention of abdominal adhesions. *American Journal of Surgery, 181*, 512–515.

Bayhan, Z., Zeren, S., Kocak, F. E., Kocak, C., Akcılar, R., Kargı, E., Tiryaki, C., Yaylak, F., & Akcılar, A. (2016). Antiadhesive and anti-inflammatory effects of pirfenidone in postoperative intra-abdominal adhesion in an experimental rat model. *The Journal of surgical research, 201*(2), 348–355.

Baykal, A., Onat, D., Rasa, K., Renda, N., & Sayek, I. (1997). Effects of polyglycolic acid and polypropylene meshes on postoperative adhesion formation in mice. *World journal of surgery, 21*(6), 579–583.

Cofer, K. F., Himebaugh, K. S., Gauvin, J. M., & Hurd, W. W. (1994). Inhibition of adhesion reformation in the rabbit model by meclofenamate: an inhibitor of both prostaglandin and leukotriene production. *Fertility and sterility, 62*(6), 1262–1265.

Dunn, R. C., Steinleitner, A. J., & Lambert, H. (1991). Synergistic effect of intraperitoneally administered calcium channel blockade and recombinant tissue plasminogen activator to prevent adhesion formation in an animal model. *American journal of obstetrics and gynecology, 164*(5 Pt 1), 1327–1330.

Ellis, H. (1971). The cause and prevention of postoperative intraperitoneal adhesions. *Surgery, Gynecology & Obstetrics, 133*, 497–511.

Fatehi Hassanabad, A., Zarzycki, A. N., Jeon, K., Deniset, J. F., & Fedak, P. W. M. (2021). Prevention of postoperative adhesions: A comprehensive review of present and emerging strategies. *Biomolecules, 11*, 1027.

Hellebrekers, B. W., Trimbos-Kemper, T. C., Trimbos, J. B., Emeis, J. J., & Kooistra, T. (2000). Use of fibrinolytic agents in the prevention of postoperative adhesion formation. *Fertility and sterility, 74*(2), 203–212.

Hershlag, A., Otterness, I. G., Bliven, M. L., Diamond, M. P., & Polan, M. L. (1991). The Effect of Interleukin-1 on Adhesion Formation in the Rat. *American Journal of Obstetrics and Gynecology, 165*(3), 771–774.

Kakanezhadi, A., Rezaei, M., Raisi, A., Dezfoulian, O., Davoodi, F., & Ahmadvand, H. (2022). Rosmarinic acid prevents postoperative abdominal adhesions in a rat model. *Scientific Reports, 12*, 18593.

Menzies, D., & Ellis, H. (1990). Intestinal obstruction from adhesions: How big is the problem? *Annals of the Royal College of Surgeons of England, 72*, 60–63.

Muscará, M. N., McKnight, W., Asfaha, S., & Wallace, J. L. (2000). Wound collagen deposition in rats: effects of an NO-NSAID and a selective COX-2 inhibitor. *British Journal of Pharmacology, 129*(4), 681–686.

Nair, S. K., Bhat, I. K., & Aurora, A. L. (1974). Role of proteolytic enzyme in the prevention of postoperative intraperitoneal adhesions. *Archives of Surgery, 108*, 849.

Nishimura, K., Nakamura, R. M., & Dizerega, G. S. (1984). Ibuprofen inhibition of postsurgical adhesion formation: Biochemical evaluation in rabbits. *Journal of Surgical Research, 36*, 115–124.

Pu, Z., Nian, H., Li, Z., Zhong, P., Ma, S., & Li, J. (2025). Research progress on animal models of peritoneal adhesion. Surgery, 178, 108929.

Rodgers, K. E., Girgis, W., St Amand, K., Campeau, J. D., & diZerega, G. S. (1998). Reduction of adhesion formation by intraperitoneal administration of various anti-inflammatory agents. Journal of investigative surgery: *the official Journal of the Academy of Surgical Research, 11*(5), 327–339.

Saba, A. A., Kaidi, A. A., Godziachvili, V., Dombi, G. W., Dawe, E. J., Libcke, J. H., & Silva, Y. J. (1996). Effects of interleukin-6 and its neutralizing antibodies on peritoneal adhesion formation and wound healing. *The American surgeon, 62*(7), 569–572.

Schaefer, S. D., Alkatout, I., Dornhoefer, N., Herrmann, J., Klapdor, R., Meinhold-Heerlein, I., Meszaros, J., Mustea, A., Oppelt, P., Wallwiener, M., & Kraemer, B. (2024). Prevention of peritoneal adhesions after gynecological surgery: a systematic review. *Archives of Gynecology and Obstetrics, 310*(2), 655–672.

Siegler, A. M., Kontopoulos, V., & Wang, C. F. (1980). Prevention of postoperative adhesions in rabbits with ibuprofen, a nonsteroidal anti-inflammatory agent. *Fertility and sterility*, *34*(1), 46–49.

Treutner, K. H., & Schumpelick, V. (2000). Adhäsionsprophylaxe. Wunsch und Wirklichkeit [Prevention of adhesions. Wish and reality]. Der Chirurg; Zeitschrift fur alle Gebiete der operativen Medizen, 71(5), 510–517.