Due to their anatomical position, the surgical removal of impacted third molars results in oedema, pain, and trismus. The purpose of this study was to evaluate the efficacy of supraperiosteal injection of methylprednisolone compared with an oral tablet form and intravenous (i.v.) injection in the prevention of postoperative pain and oedema associated with inflammation. This randomized, prospective, and controlled study included 44 patients. The patients were randomly divided into four groups: group 1 (control; no steroids), group 2 (local injection), group 3 (oral tablets), and group 4 (i.v. injection). On days 2 and 7 following surgery, linear oedema was determined using facial landmarks, and maximal mouth opening was measured. Postoperative mouth opening and swelling were evaluated for each route of methylprednisolone administration and compared. The female (59%) to male (41%) ratio was 1.44; the mean age of the patients was 29.6 years. The level of significance was set at $P<0.01$ for mouth opening and $P<0.05$ for oedema. With regard to trismus, all three routes of administration demonstrated better efficacy in comparison to the control. While oral administration and i.v. injection of methylprednisolone achieved similar results, masseter injection provided better results in reducing oedema and trismus when compared to the control following lower third molar surgery.