The effects of serum and urinary cortisol levels of topical intranasal irrigations with budesonide added to saline in patients with recurrent polyposis after endoscopic sinus surgery

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ABSTRACT

Background: *The delivery of topical intranasal corticosteroid sprays has traditionally been the primary method of treating recurrent nasal polyposis. An emerging treatment for polyposis is budesonide nasal irrigations. Delivered at concentrations nearly 100 times greater than found in prescription nasal sprays, there have been little studies on the effects of budesonide irrigation on the adrenal axis. Therefore, we investigated whether irrigation with budesonide solution was associated with any increase in serum cortisol and 24-hour urinary cortisol levels.*

Methods: *Patients who previously had undergone endoscopic sinus surgery and were not taking prednisone for 3 months were prospectively enrolled in this study. Patients irrigated twice daily with 0.5 mg/2 mL of budesonide mixed with 240 mL of saline solution. Serum cortisol and 24-hour urinary cortisol were collected before drug administration and 6 weeks after continuous use.*

Results: *Ten patients completed this study. The average serum cortisol and 24-hour urinary cortisol before drug administration were 9.8 ± 5.4 μg/dL and 28.1 ± 15.1 μg/24 hours, respectively. After 6-week follow-up, the average serum cortisol and 24-hour urinary cortisol were 12.8 ± 3.5 μg/dL and 16.5 ± 5.6 μg/24 hours, respectively. Normal ranges for serum cortisol and 24-hour urinary cortisol are 5–25 μg/dL and 4–50 μg/24 hours, respectively.*

Conclusions: *Irrigation with budesonide, 0.5 mg/2 mL, in 250 mL of saline solution does not result in decreases of serum cortisol and 24-hour urinary cortisol levels. Based on this, we feel irrigation with budesonide solution is safe to perform in patients as an alternative to traditional aerosolized steroid sprays or systemic corticosteroids.*

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Key words: Adrenal suppression, budesonide, chronic rhinosinusitis, corticosteroids, cortisol, nasal irrigation, nasal polyps, outcomes, safety

Rhinosinusitis is a common disorder accounting for an estimated 30 million physician office visits in the United States each year.[1,2] Despite multiple attempted treatments, including an estimated 500,000 surgeries per year,[3] the disease continues to be a major health problem, both in expenditures and in poor quality of life.[1,4]

The medical management of chronic rhinosinusitis (CRS) focuses on treatment of the underlying inflammatory disorder. The use of topical and systemic corticosteroids is common among otolaryngologists,[5] given their inhibitory effects on inflammatory pathways.[6–9] Intranasal corticosteroids are commonly used as first-line treatment modalities for patients with CRS. One such topical agent, budesonide, is a potent anti-inflammatory corticosteroid designed to have a high ratio of topical to systemic activity, and this agent has been proven safe and effective in multiple investigational studies[10–16] when applied intranasally. Although systemic corticosteroids exert more potent control of the underlying inflammatory pathway in chronic sinusitis, these medications have significant side effects such as agitation, dyspepsia, elevated intraocular pressure, exacerbation of hypertension, weight gain, fluid retention, osteoporosis, avascular necrosis of the hip, and hypothalamic-pituitary-adrenal (HPA) axis dysfunction.

In a topical form, more potent forms of intranasal corticosteroid irrigations have bypassed traditional controlled trials, and physicians continue to use them without evidence of safety or efficacy. Therefore, this study was undertaken to assess the effect of topical budesonide saline irrigations on systemic cortisol levels.

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METHODS

Patients ≥18 years of age who had previously undergone endoscopic sinus surgery (ESS) and had evidence of recurrent polyposis were enrolled in this study. All recruited patients had not taken any form of systemic corticosteroids for at least 3 months before enrollment. Patients <18 years of age; pregnant women; and patients with immune dysfunction, known HPA axis dysfunction, or prior pituitary or adrenal surgery were excluded from this study. This study was approved by the Institutional Review Board. Patients were not paid for participation in this study. Patients were instructed to perform irrigation twice daily using budesonide, 0.5 mg/2 mL, mixed in 240 mL of saline solution (1 L of distilled water, 1 tsp of noniodinated salt, and 1 tsp of baking soda) using a commercially available irrigation bottle (NeilMed, Santa Rosa, CA).

Serum cortisol levels were drawn by licensed phlebotomists between the hours of 6 and 8 A.M. and were assessed at baseline (pretreatment) and at 6 weeks (posttreatment) during the study period. In addition to serum cortisol assays, patients were given preservative-free containers for 24-hour urine collections to assess cortisol and creatinine levels. Collections were performed at baseline and at 6 weeks. All patients adhered to the following urine collection protocol. On the morning of day 0, patients were instructed to void in the usual fashion without collecting any urine. For the remainder of day 0, patients were instructed to collect any urine in the container. On the morning of day 1 after awakening, patients were instructed to collect the morning (final) void in the container. Patients were instructed to seal and refrigerate the container when not being used for collection. After the final void, patients were instructed to return the container that day for processing.