ScienceDirect

Annals of Emergency Medicine

Available online 2 March 2024

In Press, Corrected Proof What's this?

Pain management and sedation/original research

Topical Diclofenac Versus Oral Ibuprofen Versus Diclofenac+ Ibuprofen for Emergency Department Patients With Acute Low Back Pain: A Randomized Study

Nauman Khankhel MD [a], Benjamin W. Friedman MD, MS [b], Jesse Baer MD [b], Lucy Lopez RPA [b], Carmen Feliciano RN [b], Sharon Lee PharmD [b], Eddie Irizarry MD [b]

Show more

https://doi.org/10.1016/j.annemergmed.2024.01.037

Get rights and content

Study objective

Topical nonsteroidal anti-inflammatory drugs (NSAIDs) are useful for a variety of musculoskeletal injuries. It is not known whether topical NSAIDs should be used for patients presenting with acute nonradicular musculoskeletal low back pain.

Methods

We conducted a randomized, placebo-controlled double-blind study in which patients 18 to 69 years of age visiting the emergency department (ED) with acute, nontraumatic, nonradicular, musculoskeletal low back pain were randomized at the time of discharge to treatment with 400 mg oral ibuprofen+ placebo topical gel, 1% diclofenac topical gel+ oral placebo, or 400 mg ibuprofen+ 1% diclofenac topical gel. We measured outcomes using the Roland Morris Disability Questionnaire (RMDQ), a 24-item yes/no instrument about the effect of back pain on a respondent's daily activities. The primary outcome was change in RMDQ score between ED discharge and 2 days later. Medication-related adverse events were elicited by asking whether the study medications caused any new symptoms.

Results

In total, 3,281 patients were screened for participation, and 198 were randomized. Overall, 36% of the population were women, the mean age was 40 years (standard deviation, 13), and the median RMDQ score at baseline was 18 (25th to 75th percentile: 13 to 22), indicating substantial low back-related functional impairment. In total, 183 (92%) participants provided primary outcome data. Two days after the ED visit, the ibuprofen+ placebo group had improved by 10.1 (95% confidence interval [CI] 7.5 to 12.7), the diclofenac gel+ placebo group by 6.4 (95% CI 4.0 to 8.8), and the ibuprofen+ diclofenac gel by 8.7 (95% CI 6.3 to 11.1). The between-group differences were as follows: ibuprofen versus diclofenac, 3.7 (95% CI 0.2 to 7.2); ibuprofen versus both medications 1.4 (95% CI−2.1 to 4.9); and diclofenac versus both medications, 2.3 (95% CI−5.7 to 1.0). Medication-related adverse events were reported by 3/60 (5%) ibuprofen patients, 1/63 (2%) diclofenac patients, and 4/64 (6%) patients who received both.

Conclusion

Among patients with nontraumatic, nonradicular acute musculoskeletal low back pain discharged from an ED, topical diclofenac was probably less efficacious than oral ibuprofen. It demonstrated no additive benefit when coadministered with oral ibuprofen.

Introduction

In industrialized nations, such as the United States, low back pain carries a lifetime prevalence of over 80% and results in an aggregate 2.7 million annual visits to US emergency departments (EDs).[1,2] Randomized controlled trials comparing nonsteroidal anti-inflammatory drugs (NSAIDs) to placebo support the use of NSAIDs as first-line treatment in patients with acute low back pain without sciatica.[3] However, the magnitude of NSAID effectiveness remains small, resulting in many patients with low back pain reporting persistent pain, analgesic use, and functional impairment after an ED discharge.[3,4] The addition of other pharmacologic treatments, such as oxycodone, muscle relaxants, and benzodiazepines, have not improved outcomes when added to NSAIDs.5, 6, 7, 8

Topical NSAIDs can be used for musculoskeletal pain with the goal of delivering medications directly to injured tissue while minimizing systemic side effects. Topical NSAIDs provide similar concentrations of the drugs in muscle tissue but much lower plasma concentrations than oral formulations.[9] Commercially available topical NSAID formulations include diclofenac, ibuprofen, and ketoprofen, although only the former is available in the United States.[10] Among patients with musculoskeletal sports injuries, topical NSAIDs improve pain more than placebo.[11,12] Although there is no high-quality evidence supporting the use of these medications for acute musculoskeletal low back pain, lower quality data suggest benefit.[13,14]

Given the poor pain and functional outcomes that persist beyond an ED visit for musculoskeletal low back pain and the need for effective treatments, we conducted a randomized, double-blind trial to evaluate the role of diclofenac gel, a topical NSAID, in the treatment of acute, nontraumatic, nonradicular low back pain. Specifically, we examined its potential benefit as both a synergistic drug and as a replacement for oral NSAIDs by testing the following hypotheses:

1) Combining topical diclofenac gel with oral ibuprofen will result in better low back pain functional outcomes than either drug alone as measured by improvement in the Roland Morris Disability Questionnaire (RMDQ) 2 days after ED discharge.

2) Oral ibuprofen will result in better low back pain functional outcomes than topical diclofenac as measured by improvement in the RMDQ 2 days after ED discharge.

Section snippets

Study Design and Setting

This was a randomized, double-blind, placebo-controlled comparative effectiveness trial in which we enrolled patients during an ED visit for musculoskeletal low back pain and followed them by telephone 2 and 7 days later. The Albert Einstein College of Medicine Institutional Review Board reviewed and approved this study. Written consent was obtained from all study participants. This study was registered online at http://clinicaltrials.gov↗ (NCT04611529). Enrollment commenced in March 2021 and…

Characteristics of Study Subjects

During the enrollment period, we screened 3,281 patients and enrolled 198 eligible patients (see CONSORT flow diagram, Figure). A larger percentage of women received ibuprofen alone. Baseline characteristics were otherwise similar among the 3 groups (Table1). Most patients presented with low back pain of less than 3 days duration and had an infrequent history of low back pain prior to the ED visit.…

Main Results

At the 2 day follow-up, all 3 groups showed an improvement in the mean RMDQ score compared to…

Limitations

A number of limitations must be mentioned. The first limitation is that we screened but did not include many patients because they did not meet our entry criteria. Therefore, the study participants represent only a subset of patients who present to the ED with acute nontraumatic, nonradicular low back pain. These results are therefore most applicable to patients who meet our entry criteria.

A second limitation is that we conducted this study in a urban health care system serving a…

Discussion

In this randomized, double-blind comparative effectiveness study, topical diclofenac was probably not as efficacious as oral ibuprofen for patients with acute, musculoskeletal low back pain who are discharged from an ED, and it offered no additive benefit when combined with oral ibuprofen. Therefore, this study does not support the routine use of topical diclofenac among patients who can tolerate oral ibuprofen. However, the advantage of oral ibuprofen over topical diclofenac had dissipated one …

Recommended articles

References (23)

A.L. Golob *et al.*
Low back pain
Med Clin North Am (2014)

B.W. Friedman *et al.*
One-week and 3-month outcomes after an emergency department visit for undifferentiated musculoskeletal low back pain
Ann Emerg Med (2012)

B.W. Friedman *et al.*
Diazepam is no better than placebo when added to naproxen for acute low back pain
Ann Emerg Med (2017)

B.W. Friedman *et al.*
Arandomized, placebo-controlled trial of ibuprofen plus metaxalone, tizanidine, or Baclofen for acute low back pain
Ann Emerg Med (2019)

B.W. Friedman *et al.*
Arandomized, double-blind, placebo-controlled trial of naproxen with or without orphenadrine or methocarbamol for acute low back pain
Ann Emerg Med (2018)

M. Serinken *et al.*
Ketoprofen gel improves low back pain in addition to IV dexketoprofen: a randomized placebo-controlled trial
Am J Emerg Med (2016)

S. Motov *et al.*

Comparison of oral ibuprofen at three single-dose regimens for treating acute pain in the emergency department: A randomized controlled trial
Ann Emerg Med (2019)

L. Manchikanti *et al.*
Epidemiology of low back pain in adults
Neuromodulation (2014)

B.W. Friedman *et al.*
Diagnostic testing and treatment of low back pain in United States emergency departments: a national perspective
Spine (2010)

W.H. van der Gaag *et al.*
Non-steroidal anti-inflammatory drugs for acute low back pain
Cochrane Database Syst Rev (2020)

View more references

Cited by (0)

Supervising editor: Michael Gottlieb, MD. Specific detailed information about possible conflict of interest for individual editors is available at https://www.annemergmed.com/editors.

Author contributions: NK, BWF, SL, and EI participated in conceptualization or study design. JB, LL, CF, BWF, and EI were involved in data acquisition. NK and BWF performed data analysis. NK drafted the manuscript, and all authors revised the manuscript. NK takes responsibility for the manuscript as a whole.

Data sharing statement: Data will be made available to any appropriate request to the principal investigator.

Authorship: All authors attest to meeting the four ICMJE.org authorship criteria: (1) Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND (2) Drafting the work or revising it critically for important intellectual content; AND (3) Final approval of the version to be published; AND (4) Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Funding and support: By *Annals'* policy, all authors are required to disclose any and all commercial, financial, and other relationships in any way related to the subject of this article as per ICMJE conflict of interest guidelines (see www.icmje.org). This publication was supported in part by the Harold and Muriel Block Institute for Clinical and Translational Research at Einstein and Montefiore grant support (UL1TR001073, National Center for Advancing Translational Sciences). The authors have declared that no competing interests exist.

Trial registration number: ClinicalTrials.gov pre-registration ID: NCT04611529

Please see page XX for the Editor's Capsule Summary of this article.

View full text