GYNECOLOGY

Cranberry juice capsules and urinary tract infection after surgery: results of a randomized trial

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OBJECTIVE: The risk of urinary tract infection (UTI) among women undergoing elective gynecological surgery during which a catheter is placed is high: 10-64% following catheter removal. We conducted the first randomized, double-blind, placebo-controlled trial of the therapeutic efficacy of cranberry juice capsules in preventing UTI after surgery.

STUDY DESIGN: We recruited patients from a single hospital between August 2011 and January 2013. Eligible participants were undergoing elective gynecological surgery that did not involve a fistula repair or vaginal mesh removal. One hundred sixty patients were randomized and received 2 cranberry juice capsules 2 times a day, equivalent to 2 8 ounce servings of cranberry juice, for 6 weeks after surgery or matching placebo. The primary endpoint was the proportion of participants who experienced clinically diagnosed and treated UTI with or without positive urine culture. Kaplan-Meier plots and log rank tests compared the 2 treatment groups.

RESULTS: The occurrence of UTI was significantly lower in the cranberry treatment group compared with the placebo group (15 of 80 [19%] vs 30 of 80 [38%]; odds ratio, 0.38; 95% confidence interval, 0.19—0.79; $P = .008$). After adjustment for known confounders, including the frequency of intermittent self-catheterization in the postoperative period, the protective effects of cranberry remained (odds ratio, 0.42; 95% confidence interval, 0.18—0.94). There were no treatment differences in the incidence of adverse events, including gastrointestinal upset (56% vs 61% for cranberry vs placebo).

CONCLUSION: Among women undergoing elective benign gynecological surgery involving urinary catheterization, the use of cranberry extract capsules during the postoperative period reduced the rate of UTI by half.

Key words: catheter-associated urinary tract infection, clinical trial, cranberry extract

Cite this article as: Foxman B, Cronenwett AEW, Spino C, et al. Cranberry juice capsules and urinary tract infection after surgery: results of a randomized trial. Am J Obstet Gynecol 2015;213:194.e1-8.

Urinary tract infections (UTIs) remain one of the most common hospital-acquired infections.[1] The vast majority of hospital-associated UTIs is attributed to the use of a urinary catheter.[2] Even following removal of the catheter, the risk of UTIs remains high, with postoperative patients being particularly vulnerable.

Among women undergoing elective urogenital surgery the 6 week cumulative incidence of a symptomatic UTI following catheter removal is 10-64% (reviewed elsewhere[3]), compared with 3-4% per year for women in the general population.[4] Within hours following insertion, bacteria colonize the urinary catheter surface; the incidence of significant bacteriuria is 5% per day of catheterization, regardless of gender.[5]

A metaanalysis of 7 studies of short-term catheterized patients (including men and women and surgeries of various types) found that antibiotics given at the time of catheter removal reduced UTI incidence by approximately 50%, but the risk remained significant: 4.7% within 4 weeks.[6] However, antibiotic prophylaxis is not an ideal solution because the prevalence of antibiotic resistance among urinary bacterial isolates is very high and continues to increase. *Escherichia coli* is the most common urinary pathogen; among hospitalized patients in the United States and Europe, approximately 10% of *E coli* from urinary-associated bacteremia had the extended spectrum beta-lactamase phenotype, and approximately 26% were resistant to levofloxacin.[7]

The American cranberry (*Vaccinium macrocarpon*) has been widely used for

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Received Nov. 25, 2014; revised Feb. 5, 2015; accepted April 7, 2015.

This work was supported by the National Institutes of Health (grant R21-DK-085290). M.B.B. received investigator support through the University of Michigan Building Interdisciplinary Research Careers in Women's Health Career Development Program (grant K12-HD-001438).

The authors report no conflicts of interest.

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0002-9378/$36.00 • • http://dx.doi.org/10.1016/j.ajog.2015.04.003

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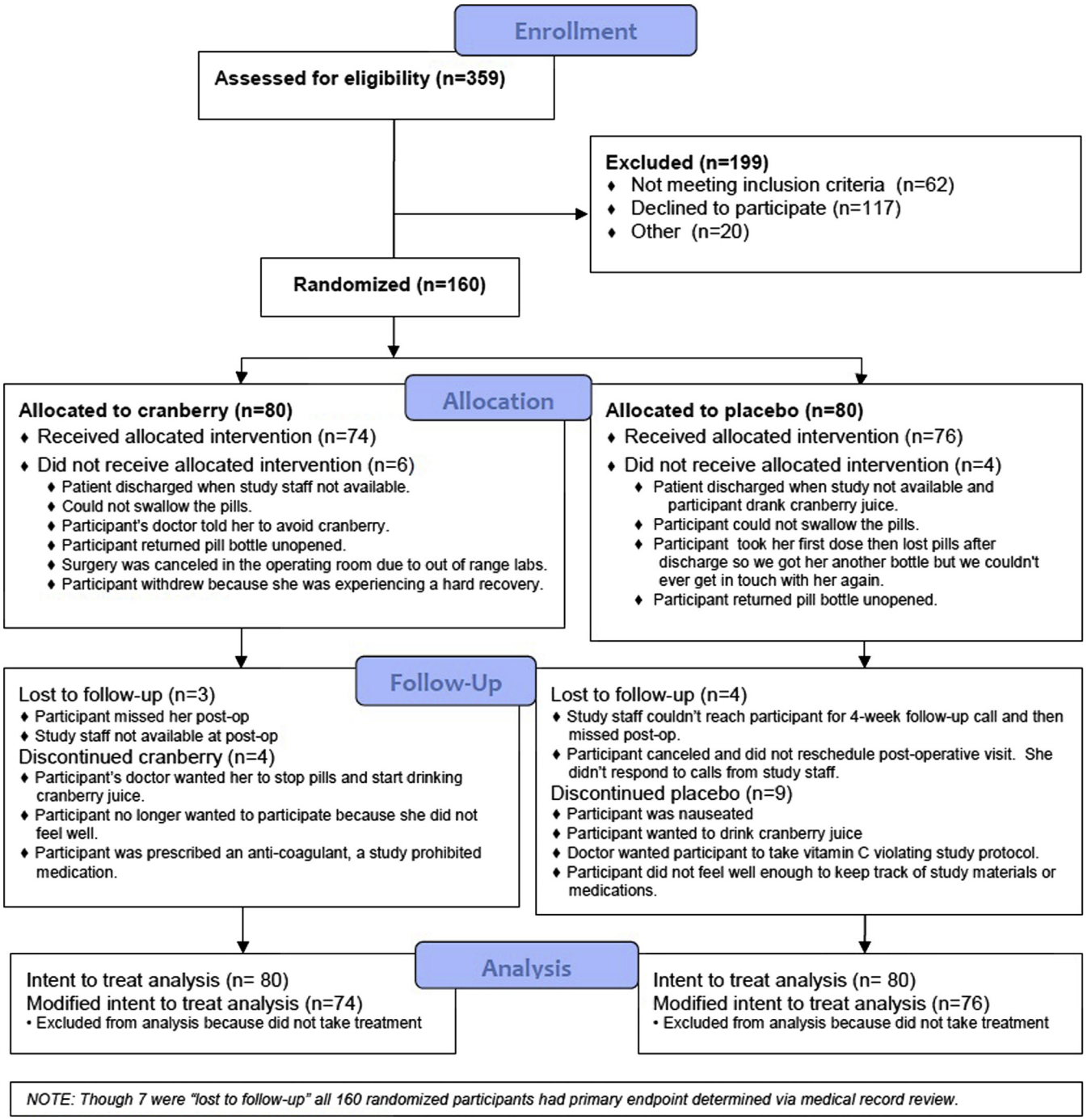
FIGURE 1
CONSORT flow diagram



Enrollment and exclusions, allocation to treatment, follow-up, and reasons for loss are shown.

CONSORT, Consolidated Standards of Reporting Trials.

Foxman. Cranberry juice capsules and UTI. Am J Obstet Gynecol 2015.

the prevention of urinary tract infections. Cranberry juice may prevent UTIs by selecting against more adhesive strains in the stool, by directly preventing *E coli* from adhering to uroepithelial cells, or by both of these mechanisms.[8,9] Other effects might include influence on fimbrial subunit synthesis, assembly, or attachment; these effects would be similar to those seen with subinhibitory concentrations of antibiotics.[10] A 2012 systematic review and metaanalysis found an