

Hair-Straightening Treatment and Acute Kidney Injury

By Jia H. Ng

Acute kidney injury (AKI) from toxin exposure is seen with systemic medications, including analgesics, certain antibiotics, and anti-neoplastic medications (1). However, the association of AKI with topical toxin exposure is not commonly recognized.

In a recent publication by Bnaya et al. (2) in the *American Journal of Kidney Diseases*, the authors reported a case series of 26 patients who developed AKI following exposure to hair-straightening products in Israel, suggesting an under-recognized cause of AKI.

Keratin-based hair straightening is a popular method used to style hair. Previous hair products were

formaldehyde-based, but formaldehyde was found to be carcinogenic (3). Thus, straightening products in Israel have largely been replaced by glycolic acid derivatives because they were considered to be safe when used topically. However, as reported in this case series, the use of hair-straightening products that contain glycolic acid derivatives may not be as safe as it appears.

The authors reported that 26 patients developed severe AKI following the hair-straightening procedure, with three of them requiring temporary dialysis. Two of the patients had recurrent AKI episodes each time following hair-straightening procedures. Seven

patients underwent a kidney biopsy, in which five of them showed oxalate nephropathy, one showed a few calcium oxalate crystals, and another showed microcalcification in the tubular epithelium. Given that glycolic acid is within the metabolic pathway of oxalate formation (Figure 1), the authors have attributed the AKI to glycolic acid.

Systemic absorption of glycolic acid through the skin is not well-documented. In this case series, only two people had serum glycolic acid and formic acid levels measured. The levels were negative for both, but one test was only performed 1 week after the hair-straightening procedure. Other studies have suggested that glycolic acid can be absorbed through the skin, particularly when the product has a low pH and high concentration of glycolic acid and the exposure time on the skin is prolonged (4, 5).

This case series suggests that a glycolic acid-based hair-straightening product is associated with the development of AKI. Although glycolic acid-based topical products have been considered safe, it is possible that systemic absorption may occur at high concentrations. Thus, caution must be taken when considering the safety of hair products. Future studies are needed to understand the extent of the problem. ■

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The author reports no conflicts of interest.

References

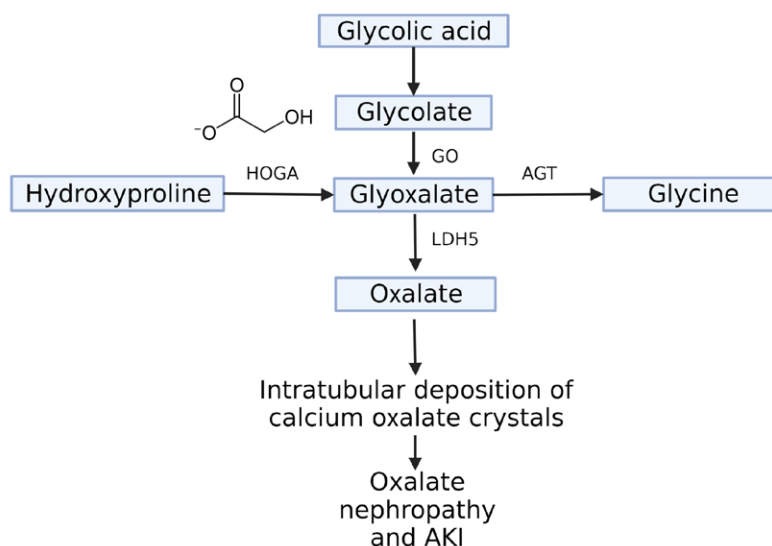
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Figure 1. AKI following hair-straightening treatment: suggested mechanism

Topical Application of Glycolic-Acid Based Hair-Straightening Product

Glycolic acid absorption through skin:

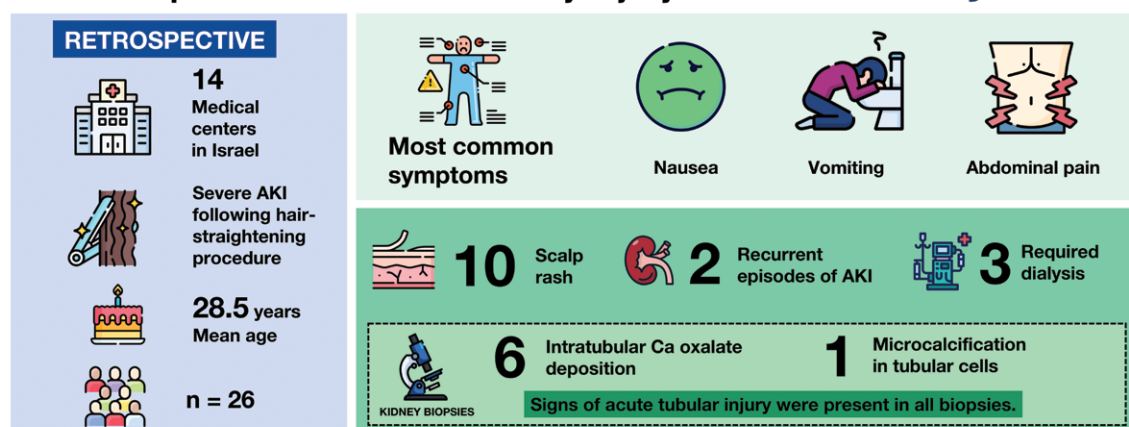
- High concentration of glycolic acid
- Low pH
- Breakage of skin



AGT, alanine:glyoxylate aminotransferase; GO, glycolate oxidase; HOGA, 4-hydroxy-2-oxoglutarate aldolase; LDH5, lactate dehydrogenase 5. The figure is adapted from Bnaya et al. (2).

Association between use of hair-straightening treatment products and acute kidney injury in Israel

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Conclusions: This study describes cases of acute kidney injury with prior exposure to hair-straightening treatments. Acute oxalate nephropathy was the dominant finding on kidney biopsies, which may be related to absorption of glycolic acid derivatives and their metabolism to oxalate.

Alon Binaya, Nabil Abu-Amer, Pazit Beckerman, et al. *Acute Kidney Injury and Hair Straightening Products: A Case Series. Am J Kidney Dis* 2023 Jan 4;S0272-6386(23)00006-9. doi: 10.1053/j.ajkd.2022.11.016

Visual Graphic by Edgar Lerma, MD, FASN