



Occupational mimics of rheumatoid arthritis: hair dye-induced arthritis

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Introduction

Hair dye (HD) products are commonly used by both sexes to enhance beauty and youth. HD and its components like paraphenylenediamine (PDD) are associated with allergic contact reactions and an increased risk for the development of ARD, like SLE or RA.

Case presentation (I)

- A 28-year-old woman presented to us complaining of pain and swelling affecting the small joints of the hands, as well as morning stiffness starting approximately 7 weeks ago.
- Past medical and family history were unremarkable.
- She was not a smoker and she received no drugs or other substances and was single.
- She denied photosensitivity, skin rashes, mouth ulcers, psoriasis, Raynaud's phenomenon, uveitis, conjunctivitis, urethritis, diarrhea and weight loss.

Case presentation (II)

- Physical examination showed swelling and tenderness affecting mainly the PIPs and MCPs bilaterally.
- The rest of physical examination was unremarkable.
- Laboratory evaluation revealed elevated CRP 13mg/dl (NV<6), and ESR 42mm/h. The rest of the laboratory tests, including EBV, Parvovirus-B19, hepatitis B and C and autoantibodies were all negative.
- Chest x-rays were normal, while hand and wrists x-rays showed only soft tissue swelling around the PIPs bilaterally.



Fig. 1 Symmetric polyarthritis of the hands. There is marked soft tissue swelling involving the metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints (mainly the 2nd and 3rd). The digits have a fusiform appearance

Case presentation (III)

- The patient noticed a close correlation between the onset of symmetrical polyarthritis and the use of HD.
- She was treated with naproxen 500mg/twice daily, with significant clinical and laboratory improvement, thus naproxen was discontinued.
- However, two months later, she used again the same HD product. Three days after its use, she developed a disease flared up consisting of pain and swelling of the PIPs, MCPs and wrists bilaterally.

Case presentation (IV)

- We advised her to quit using this particular HD product and she started naproxen again for 2 weeks. She responded very well.
- After six months off of NSAIDs treatment the patient was free of her symptoms.
- To assess whether this phenomenon (adverse product reaction AR) was due to HD , the Naranjo scale has been used.

No.	Question/Scoring Yes/ No/ Do not know or unavailable	Yes	No	NA
1	Are there previous conclusive reports on this reaction?	1	0	0
2	Did the adverse event appear after the suspected drug was given?	2	-1	0
3	Did the adverse reaction improve when the drug was discontinued or a specific antagonist was given?	1	0	0
4	Did the adverse reaction appear when the drug was re-administered?	2	-1	0
5	Are there alternative causes that could have caused the reaction?	-1	2	0
6	Did the reaction reappear when a placebo was given?	-1	1	0
7	Was the drug detected in any body fluid in toxic, concentrations?	1	0	0
8	Was the reaction more severe when the dose was increased/increasing or less severe when the dose was decreased?	1	0	0
9	Did the patient have a similar reaction to the same or similar drugs in any previous exposure?	1	0	0
TOTAL				

Naranjo CA et al. Clin Pharmacol Ther 1981, 30:239-245

Para-phenylenediamine (PPD)

- PPD is a common compound of personal use products, such as HD, but also an industrial component of fur dye.
- It is an organic component derivative of aniline.
- It is white, solid but it becomes dark due to its oxidation.
- Thus, PPD is used in HD because it is a permanent dye that gives a natural darker color and the dyed hair can be washed without losing its character.
- However, PPD when comes in contact with the epidermis is oxidized and becomes an allergic hapten, causing contact dermatitis, eye irritation, asthma and ARD.

PPD




- The development of autoimmune phenomena and diseases following exposure to PPD is postulated to occur through various mechanisms like:
- Apoptosis-mediated autoimmunity
- Molecular mimicry
- Immunological cross-reactivity
- As a consequence an increased production of proinflammatory cytokines and immune complex formation have been described.

HD and diseases development

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Conclusions

- This is the first described case of HD-induced arthritis.
- Physicians must be aware and recognize these symptoms and signs of patients exposed to HD products.
- Stopping the use of the particular HD product is an imperative.
- Small doses of steroids for a short period of time, or NSAIDs may improve the clinical symptoms.