

Contact Allergy to Hearing Aids

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Introduction Hearing aids are commonly used to improve auditory function in individuals with hearing loss, but their use can sometimes lead to dermatological issues, including contact dermatitis. This case report discusses a 65-year-old male who developed contact dermatitis due to the use of hearing aids and highlights the differential diagnoses for intolerance to hearing aid components. The key differential diagnoses include skin intolerance to the hearing aid tips, improper positioning of the tips, otitis externa, exacerbation of pre-existing dermatoses, and contact dermatitis.

Case Report A 65-year-old male with a history of progressive hearing loss developed erythema, itching, and scaling around the ear canal after using hearing aids resistant to the various treatments used. The symptoms were localized to the areas in contact with the hearing aid tips. The patient had a known history of occupational contact allergies to Amerchol L101, octyl-isothiazolinone, lauryl glucoside, nickel, and acrylates (hydroxyethyl methacrylate, hydroxypropyl methacrylate, ethyleneglycol dimethacrylate, tetrahydrofurfuryl methacrylate, triethyleneglycol diacrylate), which had been identified through prior patch testing. After a detailed evaluation and new patch tests, the patient was diagnosed with contact dermatitis to components in the hearing aids:

He reacted to epoxy resin (present in glues and plastics), rubber vulcanizing agents (diethyl and dibutyl thioureas, dodecyl mercaptan, cyclohexyltio phthalimide).

The patient reacted strongly to the 3 patch tested tips.

The treatment plan involved discontinuing the use of the current hearing aid tips. Gold was chosen as an alternative because the patient showed no allergic response to it, making it a suitable option to replace the plastic and rubber materials.

The complete resolution of eczema was finally obtained thanks to the suppression of these allergens.

Discussion The differential diagnosis for ear discomfort and dermatitis caused by hearing aid includes several conditions:

1. **Skin Intolerance to Hearing Aid Tips:** Skin intolerance occurs due to the pressure and friction of the hearing aid tips on the skin, causing irritation. This form of intolerance is distinct from an allergic reaction and typically resolves spontaneously within 7 to 10 days.
2. **Improper Positioning of Hearing Aid Tips:** Improper positioning of the hearing aid tips may lead to persistent pain and discomfort, which typically lasts for more than 10 days. This condition resolves with readjustment by the audiologist, which restores proper fit and alleviates pressure on the ear.
3. **Otitis Externa:** External otitis is an infection of the ear canal, often favored by heat, humidity, and maceration due to inadequate ventilation. The wearing of hearing aids can exacerbate this condition if the device is not well-

maintained, leading to moisture accumulation and poor air circulation in the ear canal. However, in cases of persistent or recurrent otitis externa, especially with poor treatment outcomes, an underlying **otomycosis** should be considered. Otitis externa is typically treated with antibiotic ear drops.

4. **Exacerbation of Pre-existing Dermatoses:** Conditions like seborrheic dermatitis, head and neck dermatitis or psoriasis can be exacerbated using hearing aids, leading to flare-ups of pre-existing skin conditions.
5. **Contact Dermatitis:** The most likely diagnosis in this patient, contact dermatitis occurs due to a direct immune response to an allergen present in his hearing aids confirmed by Patch testing.

This case underscores the importance of considering multiple differential diagnoses when a patient presents with ear canal irritation due to hearing aids, especially when distinguishing between allergic and irritant reactions, infections, or exacerbations of pre-existing skin conditions. Patch testing is a valuable diagnostic tool in confirming contact dermatitis.

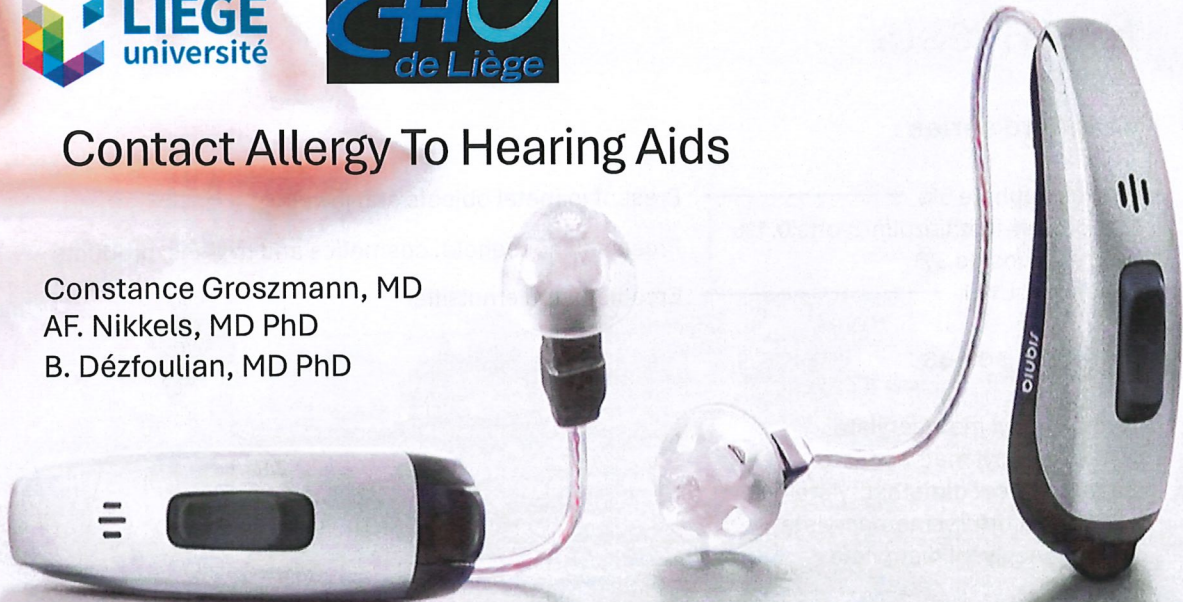
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Clinical case

65-year-old patient

Oozing eczematous lesions inside the ears, resistant to the various treatment used

Cessation of the use of the earmolds is associated with lesion regression

Former painter

Contact allergies of occupational origin is already known in this patient

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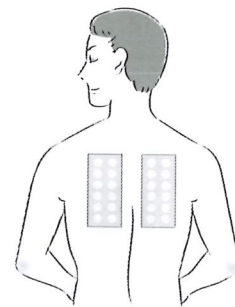
Patch tests

Standard series :

Nickel sulphate 5%	→	Present in metal objects and jewelry
2-n-octyl-4-isothiazolin-3-one 0.1%	}	Present in household, cosmetics and hygiene products
Laurylglucoside 3%		
Amerchol L101	→	Emollient and emulsifier

Acrylate series :

Hydroxyethyl methacrylate
 Hydroxypropyl methacrylate
 Ethyleneglycol dimethacrylate
 Tetrahydrofurfuryl methacrylate
 Triethyleneglycol diacrylate



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Patch tests

Standard series :

Epoxy resin 1%	→	Occupational origin, present in glues and plastics
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Rubberadd :

Diethylthiourea 1%	}	Rubber vulcanizing agents
Dibutylthiourea 1%		
Dodecylmercaptan 0.1%		
N-cyclohexyltio phthalimide		

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Patch tests

Standard series :

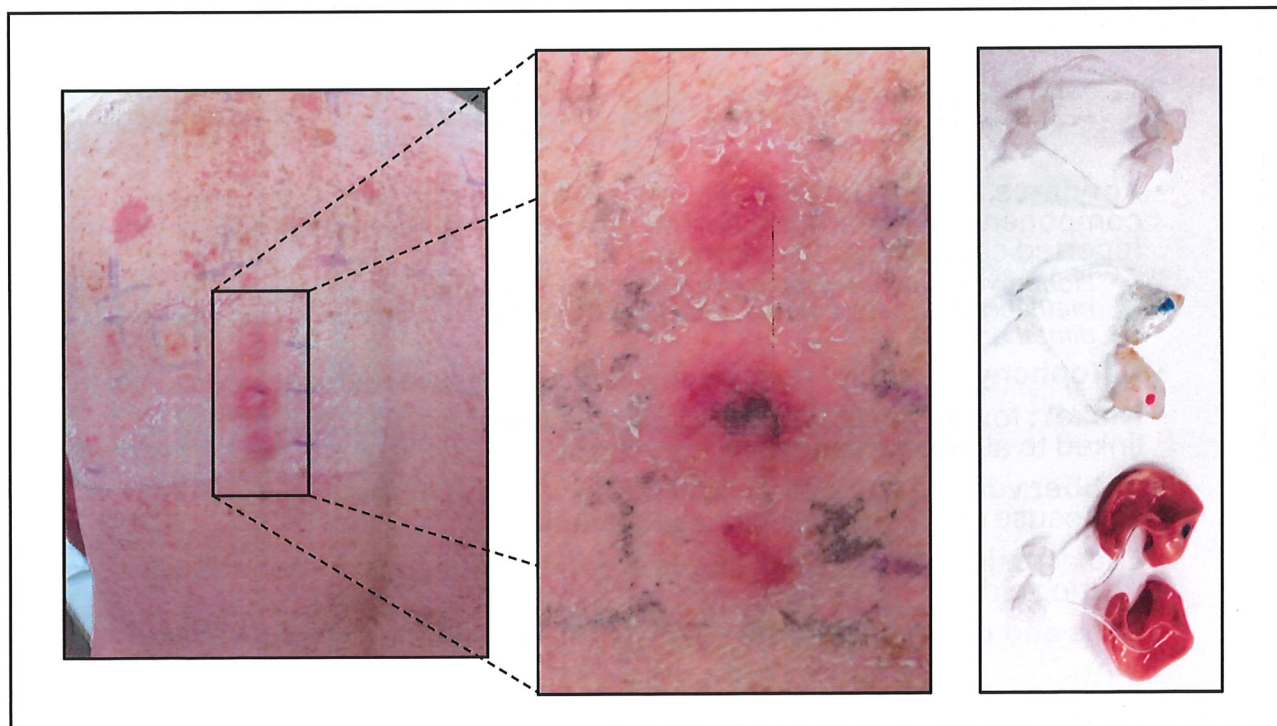
Epoxy resin 1% → Occupational origin, present in glues and plastics

Rubberadd :

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} Rubber vulcanizing agents

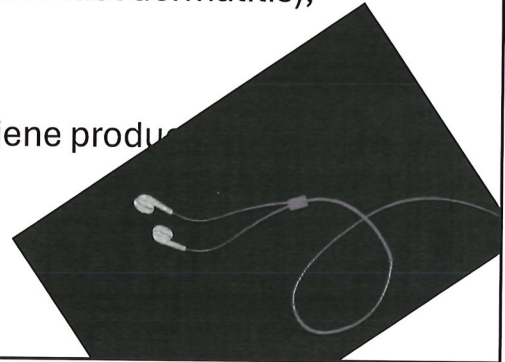
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Ear contact dermatitis

- Suspected products : hearing aids, earphones, glasses, dyes, earrings (nickel), topical products (drops and creams), goggles, metal (nickel) or plastic frames for glasses, perfumes, stethoscope, insertion of metal objects in the external ear canal, helmets, bath caps, nail varnish (ectopic contact dermatitis), hairnets...
-  Be cautious of allergies caused by hygiene products used for cleaning the hearing aid



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Contact dermatitis : Identified Allergenic Materials

- **Acrylates and methacrylates** (mainly methyl methacrylate) : major components in hearing aid earmolds and shells, responsible for most reported cases of allergic dermatitis
 - *Isobornyl acrylate, polyethylene glycol dimethacrylate, 2-hydroxyethyl methacrylate, methyl methacrylate, triethylene glycol dimethacrylate, urethane dimethacrylate*
- **Colophony** : a natural resin used as an adhesive in some devices
- **Nickel** : found in metallic components of hearing aids, commonly linked to allergic reactions
- **Rubber vulcanizing agents and Latex** : used in rubber molds, which can cause reactions in sensitized patients
- **Epoxy resins** : used as adhesives or for the finishing components of hearing aids
- **Dyes and chemical agents** : used in the final coating of hearing aids

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Contact dermatitis

- Conduct an allergy investigation with patch testing to identify specific allergens
- Use high-pressure acrylic or high-pressure silicone to minimize allergenic potential
- Add a coating :
 - PVC (polyvinyl chloride)
 - Gold-coated earmold
 - Rhodium-coated earmold
- Apply a photoplastic varnish to reduce direct contact with allergens
- Consider a bone-anchored hearing aid (BAHA) as an alternative

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Effective management of our patient

- Replacing earmolds or shells with **hypoallergenic materials**
 - add a coating : 'gold' tip
- Using topical treatments, such as corticosteroid creams or emollients, to reduce inflammation
- Maintaining a strict cleaning regimen for hearing aids
- And recommending hygiene products free of contact allergens to which the patient had reacted

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Differential diagnoses for intolerance to hearing aid devices

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Skin intolerance to hearing aid tips

- > 1/3 of patients complain of itching at the beginning of hearing aid use, especially with custom-made ear tips
 - Pressure and friction of the hearing aid tips on the skin

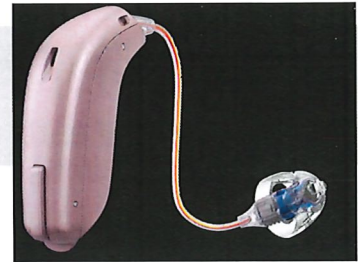
→ Erythematous skin : no wounds, erosions, oozing, or pain on palpation

- Spontaneous resolution within 10 days



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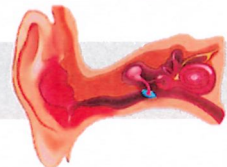
Improper positioning of hearing aid tips



- Cause persistent pain lasting over 10 days
 - Ear hook too short → ulceration of the helix
 - Earmold inserted too deeply into the ear canal → irritation
 - Earmold too small → movement within the ear canal → irritation / itching
- Pruritus, pain, irritation, wounds and infections
- Consult the audiologist to check the fitting of the earmold

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Otitis externa

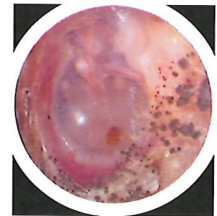


- Edema, erythema, pruritus and discomfort or severe pain
- Favored by heat, humidity and maceration due to poor ventilation and improper maintenance of hearing aids
- Antibiotic ear drops (targeting *Staphylococcus aureus* and *Pseudomonas aeruginosa*) : administer 2x/day for 1 week, discontinue the use of hearing aids until full recovery
- Prevention : dry the ears after exposure to water, clean the earmolds daily with an anti-bacterial agent.

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Otitis externa

- In case of early recurrence or poor healing : **otomycosis** (or even perichondritis of the pinna)
 - Auricularum® (not available in Belgium) : contains nystatine
 - Magistral preparations : acidic ear drops (e.g. Hydrocortisone – 1% Acidic Ear Solution FTM) or antifungal ear drops (e.g. Miconazole – 2% Otic Solution FTM)
 - *The role of **oral antifungals** remains unclear and is debated*
- ⚠ Up to 27% of patients who have otitis externa and use hearing aids show a positive reaction when patch tested with earmold components



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Exacerbation of pre-existing dermatoses

- **Seborrheic dermatitis, psoriasis, or eczema** can be aggravated using hearing aids
 - Pruritus and recurrent otitis externa
- The koebnerization related to hearing aids is a very rare cause of dermatitis and one of the main differential diagnosis of contact allergic dermatitis
- No reaction to patch tests
- **Corticosteroid creams**

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Conclusion

- This case emphasizes the need to consider allergic reactions and skin intolerance when evaluating ear discomfort in hearing aid users.
- Allergic contact dermatitis to hearing aids is a common but often underdiagnosed issue.
- Prompt identification of specific allergens through patch testing is essential for an effective management.
- In patients with a history of allergy to common materials like **nickel, acrylates and epoxy resin**, alternative materials such as **gold** can be used to replace plastic or rubber ear tips.
- Proper maintenance of hearing aids and regular follow-ups with an audiologist are key to preventing **otitis externa** and other ear-related issues.

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Thank you for listening !

