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Compatibility of local anesthetic and corticosteroid mixtures in transforaminal epidural steroid injections

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Background and Importance

CT-guided transforaminal epidural steroid injection (TFESI) has become increasingly used in the treatment of radicular pain. Frequently, corticosteroids are combined with local anesthetics in injection before administration. The selection of pharmacologic agents for this procedure presents several challenges. One significant concern is the compatibility of the local anesthetic and corticosteroid mixture.[1] Mixing local anaesthetics with corticosteroids can result in precipitation of crystals.

This incompatibility may lead to:

- decrease in the efficacy of the local anesthetic
- potential safety risks for patient.[2]

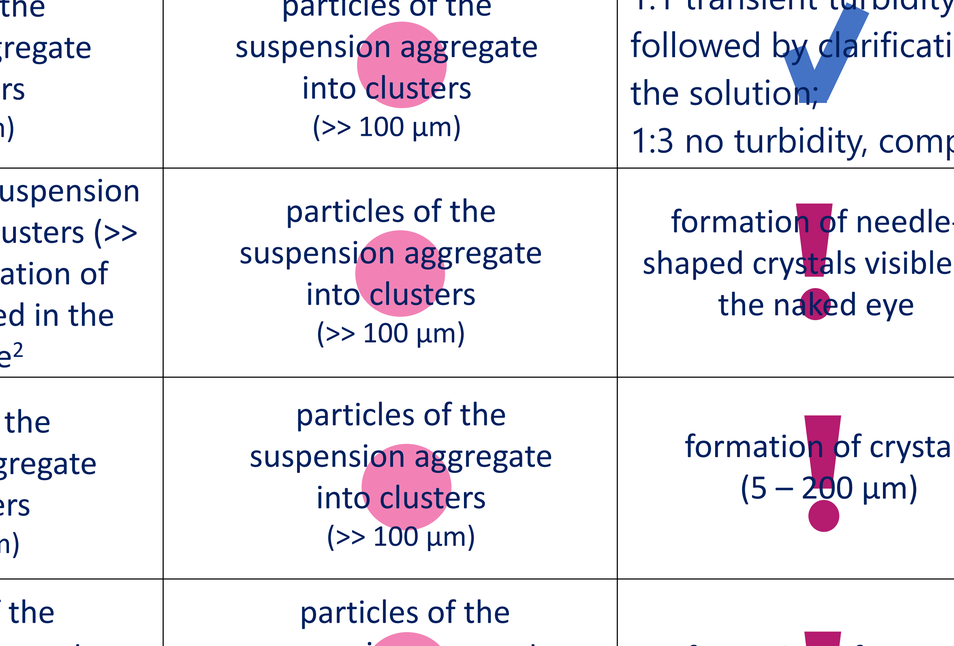
Aim and Objectives

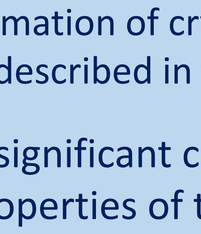
We aimed to assess the compatibility of local anesthetic and corticosteroid mixtures.

Materials and Methods

1. Literature search:
   - PubMed®
   - ASHP Injectable Drugs[3]

2. Experiment:





Formation of crystals in the mixture was visually observed and subsequently confirmed through microscopic examination. The size of the crystals was assessed using a microscope slide with a micrometer scale.

Results

	betamethasone 5 mg/ml + 2 mg/ml	**methylprednisolone acetate** 40 mg/ml	**dexamethasone** 4 mg/ml
lidocaine 20 mg/ml	particles of the suspension aggregate into clusters (>> 100 µm)	particles of the suspension aggregate into clusters (>> 100 µm)	1:1 transient turbidity followed by clarification of the solution; 1:3 no turbidity, compatible[3]
levobupivacaine 5 mg/ml	particles of the suspension aggregate into clusters (>> 100 µm), formation of crystals described in the literature[2]	particles of the suspension aggregate into clusters (>> 100 µm)	formation of needle-shaped crystals visible to the naked eye
trimecaine 10 mg/ml	particles of the suspension aggregate into clusters (>> 100 µm)	particles of the suspension aggregate into clusters (>> 100 µm)	formation of crystals (5 – 200 µm)
bupivacaine 5 mg/ml	particles of the suspension aggregate into clusters (>> 100 µm)	particles of the suspension aggregate into clusters (>> 100 µm)	formation of crystals (5 – 100 µm)

! formation of crystals (*in vitro* or described in the literature)

● significant change in the properties of the suspension

✓ no crystals are formed; a clear solution is produced

Conclusion

Mixtures of local anesthetic and corticosteroid are potentially unsafe due to possible incompatibilities. Caution is warranted during their use in TFESI.

References

1 Van Boxem K a kol. Safe Use of Epidural Corticosteroid Injections: Recommendations of the WIP Benelux Work Group. Pain Pract. 2019;19(1):61-92.

2 Choi EJ a kol. Non-Particulate Steroids Combined with Local Anesthetics: A Potentially Unsafe Mixture. J Pain Res. 2021;14:1495-1504

3 ASHP, Handbook on Injectable Drugs by American Society of Health-System Pharmacists, 20th edition, ISBN 158528615X, 1400s.

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