In-vitro Tests Suitability in Severe Systemic Reaction due to Several Drugs

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Abstract

Background: Toxic-Epidermal-Necrolysis might be a severe delayed reaction to drugs, so in-vitro assessment could be suitable. To date there are not validated diagnostic procedures for such cases.

Methods: A 33 year-old female suffering from Multiple-Sclerosis (MS) was receiving Beta1a-Interferon from the last 2.5 months, Deflazacort 1 month and Ibuprofen occasionally. She consulted the emergency department due to confluent dianiform macule, denuding blisters and subsequent systemic symptoms which led to toxic epidermal necrolysis after skin biopsy result. Cyclosporine, Prednisone, Zinc-Sulfate baths and complete discontinuation of implicated medication achieved total symptom relief. A Basophil Activation Test (BAT) and Lymphocyte-Transformation-Test (LTT) were carried out using Beta1a-Interferon, Deflazacort and Ibuprofen at different dilutions for each culprit medication (1/1, 1/10, 1/100, 1/1000). Glatiramer-Acetate(GA) hasn’t been reported as TEN/SJS cause, therefore neurology-department considered it as a secure alternative to Beta-1a-Interferon so it was in-vitro assessed likewise.

Results: BAT and LTT results were inconclusive. In vivo tests: Intradermal test to GA at progressive dilutions (1/1, 1/10, 1/100, 1/1000, 1/10000) resulted negative. Oral Challenge Tests to Acetaminophen-1 mg, Prednisone-30 mg and 1-gram Intravenous Methyl-prednisolone resulted negative.

Conclusion: Up-to-date cutaneous lesions limited to injection sites have been reported following Beta-1a interferon treatment but the former had not been involved in a widespread reaction yet. We present a rare case of TEN due to several drugs in which in-vitro tests have been unhelpful, to manage this condition. Further studies would be helpful to clarify its suitability, mainly in immunomodulating medication.

Keywords: Epidermal necrolysis; Toxic; Multiple sclerosis; Interferon-beta; Neurology; Drug hypersensitivity

Introduction/Background

Toxic Epidermal Necrosis (TEN) is a rare but life-threatening cutaneous eruption with systemic features mainly caused by drugs in which there is at least 30% of skin detachment so in-vitro assessment might be useful to avoid insecure drug challenges [1]. Most reactions occur among the first eight weeks of treatment. Infection, vaccination and graft-versus-host disease are additional causes [2].

Materials and Methods

A 33 year-old female suffering from relapsing-remitting Multiple-Sclerosis was receiving Beta1a-Interferon during the last 2.5 months, Deflazacort 1month and Ibuprofen occasionally due to Beta1a-Interferon flu-like side effects. She was referred from Dermatology department due to erythematous, confluent morbilliform macule beginning at her neckline and thorax subsequently spreading to palmoplantar and extremities regions accompanied by denuding blisters which began the previous week (Figure 1 and Figure 2). By that time she consulted the Emergency-Department (ER) due to erythematous, confluent morbilliform maculae, denuding blisters and subsequent systemic symptoms which led to toxic epidermal necrolysis after skin biopsy result. Cyclosporine, Prednisone, Zinc-Sulfate baths and complete discontinuation of implicated medication achieved total symptom relief. A Basophil Activation Test (BAT) and Lymphocyte-Transformation-Test (LTT) were carried out using Beta1a-Interferon, Deflazacort and Ibuprofen at different dilutions for each culprit medication (1/1, 1/10, 1/100, 1/1000). Glatiramer-Acetate(GA) hasn’t been reported as TEN/SJS cause, therefore neurology-department considered it as a secure alternative to Beta-1a-Interferon so it was in-vitro assessed likewise.

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Ibuprofen. Glatiramer-Acetate (GA) shifts the population of T-cells from pro-inflammatory Th1-cells to regulatory Th2-cells, considered a suitable treatment instead of Interferon, was also tested. Different dilutions for each medication (1/1, 1/10, 1/10^2, 1/10^3) were tested. LTT was also performed using Pichler’s recommendations [3].

**Results**

Basophil Activation Test and Lymphocyte Transformation Test results were inconclusive. In vivo tests: We performed intradermal test to GA at progressive dilutions (1/1, 1/10, 1/10^2, 1/10^3, 1/10^4, 1/10^5) resulting negative. Due to the severity of the reaction only alternative drugs were tested. Oral Challenge Tests to Acetaminophen 1 mg, Prednisone 30 mg and 1-gram Intravenous Methyl-prednisolone (MP) (to point out that MP is a first-election drug in Multiple-Sclerosis attacks as indicated by Neurology-Department), were performed in separate days and resulted negative in all of challenges.

As TEN might be a severe delayed reaction to drugs, in-vitro assessment (LTT and/or BAT) could be valuable alternatives. Kim et al. [4] reported a TEN case in which Deflazacort and Enalapril were the causative drugs. As they report it is extremely difficult to identify the culprit drug based on the patients’ drug history, particularly in cases in which multiple medication is involved, however to date there are not validated diagnostic procedures for such cases, so diverse complementary tools are objects of current research [5]. Ibuprofen has previously been related to Stevens-Johnson syndrome by Neuman et al. [6]. To our knowledge there are not previous TEN/SJS linked to Beta1a-Interferon use. Casoni et al. [7] presented a case of severe vasculopathic skin lesions after two months of therapy with Beta 1a-Interferon, but those lesions appeared exclusively in injection sites, not spreaded as our case in which the cutaneous lesions appeared at a distance from the injection sites in such aggressive manner. Inafuku et al. [8] reported a case of cutaneous ulcerations following subcutaneous Beta-1b Interferon injections after 6 months of treatment. Authors conclude that local cytokine-mediated, adverse, immune reaction or non-specific cutaneous inflammatory reaction to interferon, Beta-1b initiated the skin ulceration long after institution of therapy at the injection sites, may constitute possible mechanisms, and the reaction might be related to the depth of injection. Our case differs from the former in the extension of the cutaneous lesions and also because the cutaneous disruption is not limited to injection sites.

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LTT has recently evinced promising results in delayed-hypersensitivity reactions to drugs as reported by Kano et al., carried out in DRESS and TEN/SJS events [9].

Patient follow up was fulfilled within 1 month after discharge. Control analysis performed at that time, showed normal values on biochemistry and blood count, but the patient displayed disturbance of pigmentation of the cutaneous lesions. Her assessment included a 3 and 6 months after discharge follow-up in which recurrence of the cutaneous lesions was not observed.

**Conclusion**

We present a rare case of TEN due to several drugs in which in-vitro tests have been unhelpful, in our case, to manage this severe and life-threatening condition. Due to lack of evidence using these novel techniques to assess severe drug reactions, further studies would...
be helpful to clarify its suitability, mainly in immune modulating medication.

References