ABSTRACT

How can we find a way to minimize the local necrosis of Cobra bite ?

Patients bitten by *Naja atra* who are treated with bivalent freeze-dried neurotoxic antivenin in Taiwan have an improved survival rate but consequently developed with an unavoidable wound necrosis. The aim of this study was to evaluate the effectiveness of antivenin for the prevention of necrosis and clarify which component of the venom of *N. atra* actualy was responsible for the development of wound necrosis. The neurotoxins (NTXs) were removed from the crude venom (deNTXs), and different concentrations of deNTXs were injected intradermally into the dorsal skin of mice. After three days, the necrotic lesion diameter was found to be approximately 5 mm, and the minimal necrosis dose (MND) was calculated. A reduction in the necrotic diameter of 50% was used to identify the MND_{50}. Furthermore, both phospholipase A_2 (PLA_2) and cytotoxins (CTXs) were separately removed from the deNTXs to identify the major necrosis-inducing factor, and the necrotic lesions were scored. All mice injected with deNTXs survived for three days and developed necrotic wounds. The MND of the deNTXs for mice was 0.494 ± 0.029 μg/g. CTX was the major factor inducing necrosis. CTXs play a major role in *N. atra*-related necrosis of local wound. Prospectively, the management of *Naja atra* bites may include not only the existing antivenin to improve the survival rate but also the administration of monoclonal antibodies against the CTXs or combined treatment with other therapies, such as on site immediate decontamination with diphoterine.

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蛇咬傷是(亞)熱帶地區重要的疾病；龜殼花與眼鏡蛇是台灣全島平地最常見的蛇傷元凶，而眼鏡蛇咬傷的傷口往往容易引發潰爛壞死。台灣抗蛇毒血清的使用雖提升病人的存活率，但眼鏡蛇咬傷的局部傷口變化，仍無法因血清施注而獲得改善。本研究擬以動物模式探討「眼鏡蛇咬傷致傷口附近組織潰爛的毒素與血清中和的有效性」。

本研究採集眼鏡蛇蛇毒，分離神經毒素後，皮內注射於小鼠背部皮膚，觀察三天，記錄潰爛面積是否達直徑5毫米；依此方式，以決定最小致潰爛之蛇毒毒素濃度。再分離不同毒素成分，以釐清主要致潰爛成分。最後以不同稀釋倍數血清與挑戰劑量(兩倍最小致潰爛濃度)蛇毒混合後，觀察血清中和的有效性。

於小鼠背部皮內注射去除神經毒素的眼鏡蛇毒，小鼠可以存活進而呈現出如同人類身上的潰爛傷口，最小致潰爛之蛇毒濃度為0.494±0.029 μg/g；主要致潰爛毒素成分為細胞毒素，而且血清對於毒素致潰爛作用並無中和效果。

現行血清無法中和眼鏡蛇細胞毒素致潰爛的效果，未來也許需要考慮是否該再佐以其他治療（如: 針對細胞毒素的單株抗體或除汙劑敵腐靈）以阻止潰爛進展。