

## ISOLATION OF ARIZONA HINSHAWII FROM SNAKE-BITE WOUND

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### SYNOPSIS

An Arizona species, *Arizona hinshawii*, was isolated from a snake-bite wound. The organism was sensitive to a wide range of antibiotics, except tetracycline. This is the first case of Arizona infection recorded in Singapore.

### INTRODUCTION

The first isolation of the Arizona group was reported by Caldwell and Ryerson in 1939 from diseased reptiles (lizards) while studying reptilian haematology. The organism was then designated "Dar-es Salaam type of Salmonella variety from Arizona" because it was antigenically related to the Genus Salmonella and resembled the organism (i.e. gelatin-liquefier) which was responsible for a human case of pyrexia in Dar-es Salaam, East Africa. Later, in 1941, Kauffmann worked out the antigenic formula of the organism and renamed it *Salmonella arizona*. However, in 1947, Edwards *et al* examined the serotypes and found that they belonged to an independent group and changed the Generic name to Arizona. Subsequently, the Arizona group was widely studied and many names suggested such as *Arizona arizonae*, *Paracolobactrum arizonae*, until finally in 1969, Ewing gave it the name *Arizona hinshawii*.

In recent years, workers have shown that animal pets and poultry are reservoirs of pathogenic organisms, in particular, the Salmonella group. Kauffmann (1966) described the occurrence of human Salmonellosis infected by pets through the classical faeces-hand-mouth route. The first culture of Arizona ever recovered from man was in 1944 (Seligmann *et al*) from the stool of a 58 year-old woman who was suffering from high fever, vomiting and diarrhoea. In 1945, Australian workers (Ferris *et al*) isolated Salmonella-like organisms from several cases in a single hospital. The organisms resembled biochemically and serologically the Arizona group. This was believed to be the first known occurrence of the organisms in human transmitted infection. In 1952 (Butt *et al*), the isolation of Arizona from the ear of a patient with otitis media was reported, this being the first time Arizona was recovered from a source other than faeces in man. Edwards *et al* in 1956 presented a summary of the

Arizona infections in man and animals in the W.H.O. Bulletin.

In this paper, we present a case of Arizona infection in Singapore.

### MATERIAL AND METHODS

A five year-old boy was admitted to the Singapore General Hospital on 18.8.75 following a snake-bite on the right hand the previous evening. Unfortunately he could not describe the snake so it could not be identified but from the report given by the father and from the site and appearance of the bite, it seems likely that the child was bitten by a coral snake. On admission, he was febrile (38°C) and lethargic. The right arm was swollen to 1½ times its normal girth, tender and pitted on pressure. There were several blisters over the flexures. Peripheral circulation and sensation were intact. On the dorsum of the right arm, there was a zone of gangrenous necrosis measuring 4 × 4 cm surrounded by a zone of erythema. In addition, there were three to four teeth marks on the dorsum near the web of the thumb just medial to the area of necrosis. The child could feed well and there was no vomiting or any respiratory distress. All other systems were normal, except for a raised total white count of 14,500/cmm. A swab from the wound taken six days after admission was cultured on blood agar, eosin methylene blue agar and in Robertson's cooked meat medium. The media were incubated at 37°C overnight.

### RESULTS

*Arizona hinshawii* (serotype 26:33:28) was recovered from all the media used. The following biochemical tests were used to identify the organism and the reactions recorded after 37°C incubation overnight:

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|---|--------------|
| 1. Indol production in 1% tryptone (Ehrlich)      | —            |
| 2. Methyl red test (Clark and Lubs)               | +            |
| 3. Voges-Proskauer test (Barritt)                 | —            |
| 4. Citrate utilization (Simmons)                  | +            |
| 5. Motility test (Edwards and Bruner)             | +            |
| 6. Oxidation-fermentation test (Hugh and Leifson) | fermentative |

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| 7. Urease production (Christensen)                             | —   |
| 8. Hydrogen sulphide production in Kligler's iron agar         | +   |
| 9. Decarboxylation of lysine, arginine and ornithine (Moeller) | +   |
| 10. Phenylalanine deamination (Ewing <i>et al</i> )            | —   |
| 11. Malonate utilization (Leifson)                             | +   |
| 12. Carbohydrate fermentation:                                 |     |
| glucose  | +   |
| lactose  | (+) |
| sucrose  | —   |
| mannitol   | +   |
| maltose  | +   |
| 13. Beta-galactosidase activity or ONPG test (Lubin and Ewing) | +   |

The strain was sensitive to cephaloridine, gentamicin, kanamycin, ampicillin, chloramphenicol, Septrin, neomycin and polymyxin B, slightly sensitive to streptomycin but resistant to tetracycline (sensitivity tests by the Kirby-Bauer method). The patient was given intravenous ampicillin and cloxacillin (250 mg. 6-hourly) for four days followed by a course of oral Septrin (Bactrim). The wound was dressed daily with Eusol, then Varidase, and began to granulate well. However, repeated swab cultures yielded *Arizona hinshawii* for two weeks, so topical neomycin was applied. Three days later, swab cultures were negative. The gangrenous patch sloughed off, and the child was given a superficial skin graft. He soon recovered and was discharged a week later.

#### DISCUSSION

It is well-known that pet animals, reptiles, etc., often harbour pathogenic organisms which infect man. In 1946, Hinshaw and McNeil reported the isolation of Arizona from the lesions of a captive rattlesnake (San Diego Zoo) which died with a necrotic liver. Following this, four of the seven rattlesnakes autopsied were found to be infected with the Arizona. In 1958, Le Minor *et al* recovered Arizona types in about 45% of the apparently normal snakes examined. In 1969 (Iveson *et al*), Arizona types were also isolated from reptiles (captive and free-ranging) in Western Australia. Due to the absence of specific geographical distribution of serotypes, the workers concluded that the reptiles provided a natural reservoir for Salmonella and Arizona strains in Australia. In view of the several reports of Arizona associated with snakes and other

lower animals, it is therefore not surprising that the infection from the snake-bite here reported was caused by an Arizona type. Edwards *et al* (1956) defined the Arizona group as a lactose fermenter with varying rapidity. Our strain fermented lactose slowly. To our knowledge, this is the first time that the isolation of *Arizona hinshawii* has been recorded in Singapore and possibly the first case resulting from a snake-bite in this region. It would be interesting therefore, to conduct a survey to study the presence of the Arizona group in lower animals and reptiles in Singapore.

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