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From the Third Medical Clinic of Osaka University (Director: Professor I. Donomae, M. D.)

Clinical Use of Strosposide

A NEW WATER SOLUBLE GLYCOSIDE

By

YOSHIJIRO MATSUMOTO & SHIGERU KASHIWAMURA

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Strosposide is a water soluble glycoside which has been isolated from the seeds of *Strophantus speciosa* and *Str. Boivinii* by Reichstein et al. 1952. In the Shionogi Research Laboratory Satoh et al. obtained the same substance from the leaves of *Digitalis purpurea* 1953. The pharmacodynamic action and the pharmacological base of its clinical use were investigated by Minesita and his colleague of Shionogi Research, obtaining the results that it has cardiotonic effect and the intensity is milder than that of Lanatoside C and G-Strophanthin, but its rates of the action display and the elimination are quicker than those of the other two glycosides.

Present report is founded on the clinical experiences of 19 cases of cardiac insufficiency in the 3rd Medical Clinic of Osaka University and Osaka Kosaiin Hospital. The results presented seem to be suggestive of its usefulness in clinical value of this glycoside.

(1) THE RAPIDITY OF ACTION.

In most cases, clinical effects were recognized in 5 to 15 minutes by intravenous use and takes 5 to 10 minutes longer by subcutaneous use.

Case 1 (Fig. 1). Female, 28. A severe case suffering from congestive heart failure caused by mitral stenosis. On admission, she was orthopnoeic and suffered from loss of sleep for the past several

Fig. 1 M. S. female. Mitral Stenosis, severe case of cardiac insufficiency

The general condition was especially serious; series of cough attack continued, heart rate was 110-120, presenting arrhythmia perpetua. The radial pulse was 70-90 with deficit of 20-30. The blood pressure was estimated 125 mmHg systolic and 100 mmHg diastolic; pulse amplitude markedly small. Respiration was 35-40 per minute.

The rapid acting cardiotonics were indicated. 2 mg of strosposide in 20 cc. of glucose solution was injected intravenously and the course was carefully observed since the treatment. As shown in Fig. 1, the deficit pulse disappeared in 15 minutes, and heart beat was 85 and pulse amplitude markedly increased. The patient was sound asleep after 3 hours.

Case 2 (Fig. 2). Male, 40, mitral steno-insufficiency. Congestive heart failure was as in the former case.

2 mg. of the preparation was injected subcutaneously, and the deficit pulse disappeared in 30 minutes

Fig. 2 M. Y. male 40: Mitral Stenosis, Severe case of decompensation

(2) MAINTENANCE OF THE EFFECT.

The maintenance of the improved symptoms treated by this preparation varies much from case to case. With a single administration of 2 or 4 mg, the effect continues 3 to 4 hours in the shorter cases and 5 to 6 hours in the longer.

Case 3 (Fig. 3). Treated with 2 mg intravenous injection, shows the duration of effective bradycardia for about 6 hours.

Case 4 (Fig. 4). Treated with 4 mg subcutaneous injection. The effect continued for about 5 hours, but in this case ventricular extrasystole was noted sug-

Fig. 3 F. M. female 13: Mitral Stenosis, severe case of cardiac insufficiency

Fig. 4 H. K. male 18: Mitral stenoinficiency, moderate cardiac insufficiency

days. gesting a slight overdosage.

(3) THE DIOSIS OF FULL DIGITALIZATION.

As described above, the effect appears by 30 minutes after the injection. Repeated administration at the intervals of 30-60 minutes was made for rapid digitalization.

The results were as follows: In adults weighing 50 to 60kg., the full dose was 2 to 6mg. which was injected 2mg. initially and 1-2mg. at 30-60 minutes intervals. In 3 cases of children weighing below 30kg., 2mg. in 2 cases showed frequent extrasystoles, nausea and vomitting while suitable for the other case. Therefore, in children, 1mg. or thereabout is considered adequate.

Case 5 (Fig. 5). An adult case of rapid full digitalization. In this case, initial 4mg. with additional 2mg. injection each at 30 minutes and again at 20 totalling 8mg. was given. Immediately after the last

Fig. 5 S. Y 25: Mitral stenoinficiency, severe case of cardiac insufficiency

injection, frequent ventricular extrasystole appeared, but subsided in about 5 minutes and heart beat decreased from the initial 110 to 60. In this case 6mg. might be adequate full dose. Side effects due to a little over-dosage subsided rather quickly.

(4) MAINTENANCE DOSE.

As the maintenance of effect is so short, the preparation is not adequate for a long continuous use. In order to maintain the fair condition, 2mg. had to be repeated 2 to 4 times daily.

(5) THE THERAPEUTIC RANGE.

The preparation has a fairly wide therapeutic range, which is considered to be very convenient for clinical use.

In Fig. 6, one column shows a case of digitalization. For example, the case on the extreme left column shows fair result by 1mg. injection and equally effective and non-toxic by 2mg. The extreme right column was equally effective with no side reactions by 4mg. and 6mg., and 8mg. injection showed extasystole.

Generally, the therapeutic range of 2 to 6mg. especially in the area of 2 to 4mg. shows the safe and effective area in most cases. But in children of below 30kg., 1mg. or less may be considered adequate and safe.

Fig. 6 The dosis and the effect of Strosposide

(6) SIDE EFFECTS.

Side effect Patients	Side effect			
	Headache	Nausea	Vomiting	Arrhythmia
Dosis				
1mg	1	1		
2mg	13	1		1
4mg	10	1	1	2
6mg	3		1	
8mg	1		1	1

Fig. 7 Side effects of Strosposide

As seen in Fig. 7, out of 28 administration of 19 cases, vomiting, and headache was observed in a very few cases, and these incidence are relatively small compared with routinely used other cardiotonics. The arrhythmia observed were all ventricular extrasystole caused by over-dosage.

When subcutaneously used, local irritations are observed. This was easily subsided with a mixture of a small dose of procain amide.

(7) COMPARISON WITH OTHER RAPID ACTING CARDIAC GLYCOSIDES.

2 mg. of this preparation was compared with 0.4 mg. lanatoside-C and 0.075 mg. of g-strophanthin, each treated at different times to the same patients.

Results in Fig. 8 and Fig. 9 suggest that bradycardia and increased pulse amplitude appeared most rapidly by strospeptide, next being lanatoside-c and then g-strophanthin. Thus, the rapid acting nature is highest in this preparation, but on the other hand the maintenance of the effect is the shortest as experienced by many cases.

Fig. 8 F. T. female 25: Mitral stenosis, slight cardiac insufficiency. Comparison of Strospeptide, Lanatoside-C and g-Strophanthin in effect on blood pressure

Fig. 9 F. T. female 25: Mitral Stenosis, slight cardiac insufficiency. Comparison of Strospeptide, Lanatoside-C and g-Strophanthin in effect on pulse rate

(8) THE USE OF STROSPESIDE ON CARDIAC EMERGENCY.

Considering the characteristic nature of this preparation as above described, it seems to be excellent

for acute cardiac insufficiency. The following two cases are such emergency case which was successfully treated by strospeptide injection.

Case 7 (Fig. 10). A case of acute cardiac insufficiency occurring in the course of post-operative state in the mitral-commissurotomy. As seen in Fig. 10, sudden frequent weak pulse was observed and blood pressure fell to 90/60 mmHg; pulse pressure markedly decreased and general conditions were bad. Initial 4 mg. of strospeptide was applied intravenously that caused immediate recovery of the condition in 10 minutes with blood pressure of 110/70 mmHg. One hour later, 2 mg. was added and fair condition was maintained. Post-operative condition was fair.

Fig. 10 S. S. male 27: Mitral stenosis, acute cardiac insufficiency in post operative state

Case 8, a case of auricular fibrillation with abnormally high ventricular rate. Female, 24 post-operated mitral steno-insufficiency. In the morning of the 25th day of post-operative state, sudden heart palpitation and orthopnoea occurred. Oxygen inhalation was started immediately after the attack, with small improvement.

When examined, heart rate was 176 and radial pulse was 96. At first, 200 mg. of procain amide was injected intravenously under the possible diagnosis of ventricular tachycardia, but failed to cure the condition. Meanwhile, ECG showed auricular fibrillation with high ventricular rate.

Strospeptide was preferred as indicative medication. Initial 1 mg. was subcutaneously injected with 1 mg. again after 15 minutes. 10 mg. of procain amide added in each injection well prevented the local irritation. In about 30 minutes later, heart rate became 98 and radial pulse 84. Oxygen inhalation was stopped, the patient was able to lie down and all complaints were thoroughly subsided.

SUMMARY

Strospeptide is superior in its rapidity of action to lanatoside-c and g-strophanthin, but inferior in the maintenance of its effect to these. It has fairly wide therapeutic range and small side effects and is

considered to be of much value in clinical use, especially in cases of cardiac emergency.

Dose: 1 to 6 mg. for full digitalization and 1-2 mg. two to four times daily for maintenance are considered to be adequate.

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