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RESULTS OF CONTINUOUS LUMBAR TRACTION IN ACUTE DORSO-LUMBAR SPINAL INJURIES WITH PARAPLEGIA

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INTRODUCTION

TRAUMATIC paraplegia is treated by conservative methods at most of the spinal cord injury centres. Indications of surgery and nature of surgery have been debatable.

Freeman in 1949 favoured an active surgical approach. Sir Ludwig Guttman in 1958 reported the disadvantages of an early laminectomy, which further deteriorated the stability of the vertebral column, and may transform anatomically incomplete lesions into complete ones (Guttman, 1973). In this respect Morgan *et al.* (1971) have given significant statistical proof. Bors in 1956 reviewed patients treated with or without laminectomy and showed that overall improvement was greatest in those paraplegics where no operative interference was deemed necessary. Bedbrook in 1963 stated that operative interference has rarely been proved to be of assistance and not uncommonly can be the final stress causing complete cord damage when a cord has not been completely severed originally.

Benecs (1965) from Prague stressed the need for a correctly indicated operation in preference to conservative treatment, although his own results of immediate laminectomy in cervical injuries were unsatisfactory. There are many patients undergoing unnecessary surgery in some centres with no clinical or neurological improvement.

Traction as a method of treatment in spinal cord injuries was first reported by Taylor (1929) quoted by Loesser (1970). He carried out Halter traction for fracture and fracture dislocation of spine with tetraplegia. This was improved by Crutchfield (1933) when he reported his first successful case. Thereafter Crutchfield reported more cases enabling improvement in the design of Crutchfield callipers. Skull traction in the treatment of cervical spine injuries with tetraplegia is universally practised. Lumbar traction has been used for treatment of prolapsed intervertebral disc in the lumbar spine with success. However, there is no report which we could find where continuous lumbar traction has been used as a method of treatment for fracture and fracture dislocation of lumbar spine with paraplegia. This method of continuous lumbar traction (fig. 1) has been used in the patients described in this paper.

FIG. 1

MATERIAL

Our centre gets about 40 traumatic paraplegics every year. We have been searching for some method which will ensure stability of the spinal column with ideal physiological conditions in the spinal canal for the first few weeks while the patient is being turned regularly. A trial with continuous lumbar traction in a case with fracture dislocation of L1 vertebra with paraplegia proved very useful.

Case No. 1. V. K., a male, aged 23 was admitted to our centre on 17 September 1971 within 48 hours of a motor cycle accident. He had complete paraplegia with fracture dislocation of the L1 vertebra. X-ray (fig. 2) showed a comminuted fracture of L1 with lateral displacement of one half of the body overriding D12 body. Surgery was considered inadvisable. Continuous lumbar traction with 22 lbs. of weight on either side was started 48 hours after trial of postural reduction and conservative treatment. Traction was maintained for ten weeks, not only when he was on his back but even when he was turned on his sides. Check X-ray (fig. 3) showed definite improvement in the alignment of spine, and opening up of spaces between D12, L1 and L1, L2. It was decided to continue traction and provide adequate space in the spinal canal for good physiological recovery to damaged nerve roots. There was sensory recovery up to L4 on the right side after two weeks of treatment. In the fourth week there was evidence of motor recovery in right quadriceps and knee flexors.

Pressure points over anterior superior iliac spines on both sides were managed by careful sponge padding and releasing the (pressure) buckles of the lumbar traction belt for a period of three minutes twice in 24 hours. He was ambulatory after 14 weeks from the date of injury with a long leg brace on his left side and short leg brace on his right side. His bladder, which was paralysed on admission recovered and he could void urine at will and hold urine for three to four hours.

FIG. 2

FIG. 3

To our surprise 18 months after the injury, the patient reported recovery of sensations and motor power up to L4 segments on his left side. This re-generation in L1, L2 and L3 nerve roots on his left side was possible as their continuity was maintained and mechanical displacement and compression was rectified by lumbar traction. He is now ambulatory with bilateral foot drop braces and is running a petrol filling station.

Case No. 2. U. K. N., male, aged 23 years fell from a height of 12 feet during physical training on 4 October 1973. He sustained compression fracture body of D12 vertebra (fig. 4) with complete motor paralysis below D12. He was admitted to our centre on 9 October 1973, five days after his injury. On admission he had complete motor paralysis below D12 with loss of knee and ankle jerks on both sides. Sensations of touch were present but impaired. His bladder was paralysed and managed by indwelling Gibbon's catheter. Lumbar traction by lumbar belt with 22 lbs. on either side was started from 10 October 1973 and continued for ten weeks. His motor power recovered and by 20 October 1973, grade I to II contractions were present in quadriceps and calf muscles.

Five weeks after injury to his bulbocavernosus reflex, ice water tests were positive and the catheter was discontinued. He has got normal bladder control. He recovered grade III to IV power by 10 January 1974 and could walk without any aids by 1 February 1974.

Case No. 3. D. K. B., male, aged 26 years was run over by a truck on 4 November 1973. He sustained a fracture of L2 vertebra with dislocation of L1 on L2 and complete paraplegia below L1.

X-ray showed fracture L2 with dislocation of L1 on L2 with locking of facets (fig. 5). On admission he had complete loss of motor power in both lower limbs

FIG. 4

with anaesthesia below L1. He was treated conservatively by bed rest for seven days followed by a POP jacket by the surgeon at the local hospital. On 20 November 1973, he was transferred to our centre. Continuous lumbar traction was started with 22 lbs. of weight on either side and continued for eight weeks. He recovered sensation and bladder control in five weeks. Motor power recovered gradually and was grade V in right lower limb and grade III in left lower limb on 20 February 1974.

FIG. 5

FIG. 6

RESULTS AND DISCUSSION

Motor Power. Encouraged by the results in case No. 1, we started continuous lumbar traction for 10 to 12 weeks for every fresh case with dorso-lumbar or lumbar spinal injury with paraplegia. Results in seven patients treated by this method from September 1971 to February 1974 are shown in Table I. Recovery

TABLE I
Motor recovery in group A: treated with lumbar traction

Level of injury	Nature of injury	Paraplegia on admission			No. of patients	Recovery in motor power	
		Complete	Incomplete			Normal power	Paralysis below L4 in both limbs
D12	Fracture dislocation	1	+	0	1	1	0
L1	Compression	2	+	1	3	3	0
L1	Fracture dislocation	1	+	0	1	0	1
L2	Fracture dislocation	1	+	0	1	1	0
L3	Fracture dislocation	0	+	1	1	1	0
	Total	5	+	2	7	6	1

in cauda equina injuries is well known. However, we were impressed with the quality of neurological recovery in seven cases treated by continuous lumbar traction. Fifteen patients with lumbar spinal injuries and paraplegia were treated conservatively during the same period (Table II). Four out of 15 had early laminectomy by neurosurgeons in other hospitals with no significant change in neurological state. Two had excellent recovery, six had good recovery and seven remained paraplegics in this group of 15 cases. In the group of seven cases treated by continuous lumbar traction, six had excellent recovery and one had good recovery, considering the severity of the injury. The number is small but significant as it gives hope of a better quality of neurological recovery than any other known method practised so far.

Sensory Recovery. Sensory recovery was complete in six out of seven patients treated by traction (Table IV). In group B treated without lumbar traction, recovery was complete in one and partial in seven out of 15 patients (Table III).

Urinary Bladder. Urinary bladder recovered fully in six out of seven and the seventh also had partial control with residual urine 5 ml. and no urinary infection (Table V). In the group B treated without traction, one of the problems was the incontinence of urine and repeated attacks of cystitis and pyelonephritis in

TABLE II
Motor recovery in group B: treated without lumbar traction

Level of injury	Nature of injury	Paraplegia on admission		No. of patients	Recovery in motor power		Paralysis below L4 in both limbs	Paraplegia or no recovery
		Complete	Incomplete		Normal power	Paralysis below L4 in one limb		
L1	Compression fracture	6	4	10	2	1	3	4
L1	Fracture dislocation	2	0	2	0	0	0	2
L2	Fracture dislocation	2	0	2	0	0	1	1
L4	Fracture dislocation	0	1	1	0	0	1	0
	Total	10	5	15	2	1	5	7

TABLE III
Sensory recovery group B: treated without lumbar traction

Level of injury	Nature of injury	On admission		No. of patients	Sensory recovery		Complete recovery	No recovery or anaesthesia
		Complete anaesthesia	Partial anaesthesia		Saddle anaesthesia	Anaesthesia below level of injury		
L1	Compression Fracture	6	4	10	4	1	1	4
L1	Fracture dislocation	2	0	2	0	0	0	2
L2	Fracture dislocation	1	1	2	1	0	0	1
L4	Fracture dislocation	0	1	1	1	0	0	0
	Total	9	6	15	6	1	1	7

TABLE IV
Sensory recovery in group A: treated with lumbar traction

Level of injury	Nature of injury	On admission			No. of patients	Sensory recovery	
		Complete anaesthesia	Partial anaesthesia			Saddle anaesthesia	Complete recovery
D12	Fracture dislocation	1	+	0	1	0	1
L1	Compression fracture	0	+	3	3	0	3
L1	Fracture dislocation	1	+	0	1	1	0
L2	Fracture dislocation	1	+	0	1	0	1
L3	Fracture dislocation	1	+	0	1	0	1
	Total	4	+	3	7	1	6

three out of 15 patients. Another nine bladders are lower motor neuron type and patients are voiding urine by straining and compression. Only three patients had a normal functioning bladder in this group (Table VI). Next to motor recovery, normal functioning of the bladder is a great achievement which any method of treatment can look for in management of traumatic paraplegia (Table VII).

TABLE V
Urinary bladder in group A: treated by lumbar traction

Level of injury	Nature of injury	Urinary bladder					No. of patients
		LMN	Mixed	LMN	Normal		
D12	Fracture dislocation	0	+	0	+	1	1
L1	Compression fracture	1	+	0	+	2	3
L1	Fracture dislocation	0	+	0	+	1	1
L2	Fracture dislocation	0	+	0	+	1	1
L3	Fracture dislocation	0	+	0	+	1	1
	Total	1	+	0	+	6	7

TABLE VI
Urinary bladder in group B: treated without lumbar traction

Level of injury	Nature of injury	Urinary bladder					No. of patients
		LMN	Mixed	LMN	Normal		
L1	Compression Fracture	6	+	2	+	2	10
L1	Fracture dislocation	2	+	0	+	0	2
L2	Fracture dislocation	1	+	1	+	0	2
L4	Fracture dislocation	0	+	0	+	1	1
	Total	9	+	3	+	3	15

TABLE VII

Nature of recovery	Lumbar traction	Without lumbar traction
<i>Excellent</i>	6	3
(a) Motor power grade V		
(b) Complete sensory recovery		
(c) Normal sphincter control		
(d) Walking without aids		
<i>Good</i>	1	5
(a) Motor power grade III to IV		
(b) Touch sensation partial		
(c) Some sphincter control		
(d) Walking with aid of braces and stick		
<i>Poor</i>	0	7
(a) Motor power 0 to II		
(b) Sensations absent		
(c) Sphincters paralysed		
(d) Walking with long leg braces and crutches short distance		
(e) Wheel chair life		
Total	7	15

SUMMARY AND CONCLUSIONS

Various methods of treatment of acute dorso-lumbar injuries with paraplegia have been reviewed. Continuous lumbar traction in seven cases gave excellent recovery in motor power; sensation and bladder control in six and good recovery with residual bilateral foot drop in one. By conservative treatment only three patients had excellent recovery, five had good recovery and seven remained paraplegics. There was a complete recovery of the bladder in six out of seven cases treated by traction as compared to three out of 15 treated by conservative regime and operative technique. Continuous lumbar traction in our opinion is a safe and rewarding method in all fresh dorso-lumbar spinal injuries with paralysis.

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Discussion

DR. F. W. MEINECKE (*Germany*). I would like to ask Dr. Chahal a question. First of all, I feel that this form of traction, if preferred, can be carried out more easily and with less danger to the skin, by bringing wire through the pelvis. But what I want to know is how does the level of the bony fracture compare with the level of the paralysis? These were very low cauda equina lesions. We are getting more and more complete lesions at the time of admission and they are getting more and more incomplete in the next weeks and even months. I would be very careful to explain this recovery as a result of the traction. What I missed in your paper were X-rays in both directions after the patient is able to stand and walk within the next three or four months.

PROF. ASCOLI (*Italy*). I should like to ask Dr. Chahal if he also applies a counter-traction and if so, where?

CHAIRMAN: SIR LUDWIG GUTTMANN. With regard to Dr. Chahal's technique of continuous lumbar traction, this method was certainly not successful in reducing the lateral displacement in the two cases and the third was a simple compression fracture without dislocation. However, I want to ask him whether he has produced some pressure sores with this kind of traction method. Dr. Ascoli was quite right in asking whether you have applied a counter-traction. Counter-traction upon the shoulder was of course the old method used many centuries ago when two people would pull the legs and another two people would pull the trunk upwards on the shoulders. As a matter of fact, I saw this for the first time in 1917 when I worked in an accident hospital as an orderly. The surgeon still used the old Calot method but with one difference: the

patient was not lying in an abdominal position but in supine and the surgeon sitting tried to reduce the fracture with his fist from below. The patient was held elevated in supine position by four people and traction was applied by pulling the legs distally and the trunk upwards by two attendants. This procedure was already described in the old literature even in Hippocrates' writings. I want to ask whether, in addition to the traction, particularly in the last case, it would have been more useful to put some support underneath the fracture, because by this procedure you might have reduced the fracture dislocation immediately?

I should like to mention one point that Meinecke brought up: to replace this conservative treatment described by Chahal, by putting wire through the pelvis. This is, I think, a terrible thing to do in paraplegic patients, as in this paralysed area the wire inevitably breaks through the bone and skin. The last case I saw of this happening was in a case from Nigeria. This may be possible to do in Nigeria where the knowledge of modern literature is still scanty, but I would seriously warn against reviving this method which has been given up all over the world for a long time. I now ask Dr. Chahal to answer the questions and comments made.

DR. CHAHAL (*India*). As far as Dr. Meinecke's question is concerned, putting wire through the pelvis or according to Sir Ludwig, the Nigerian technique, we shall not do, but our biomechanics are working on a device which can be put into the ileum and traction can be applied. The problem which arises is that if you apply it anteriorly there will be a rotation; if you apply it posteriorly there will be only one side, so you have got to have a gadget fixing the anterior spine of the ileum as well as the posterior side and a central piece to pull both. We are working on it, and given the time, probably in a year or two, we will be able to present this. Regarding the X-rays of these cases, most of them had excellent stable spines, some of them were still displaced in the position, as I showed you in the last case, but the recovery was far better than expected. Now, as for Dr. Weiss's remarks, I think we are thinking on the same lines that primarily these are cauda equina injuries where the traction is helping us. Where the cord is damaged, I am sure that no amount of traction is going to do any good. But where the nerve roots are damaged, we are bringing better alignment and giving a better chance to the roots to recover immediately, if only partially damaged, or to regrow. This was proved by the first case who had recovery up to L4 sensory and motor on the left side 18 months after injury. Now, as to Dr. Ascoli's remark about counter-traction—we apply simple counter-traction by lifting the foot end of the bed by nine to 12 inches so that the body weight is usually 140 to 150 lbs. acts as the counter-traction—no pulling, none of those fist techniques, Sir, only the Indian rope trick!

CHAIRMAN: SIR LUDWIG. Dr. Chahal, you have not answered my question—have you produced any sores?

DR. CHAHAL. Two patients had sores who had injuries at T12/L1 level, and both of them ultimately recovered fully. The sores did not interfere, except that we often had to release the buckles of the belt and attend to the patient.

CHAIRMAN: SIR LUDWIG. That only proves that you have to be very careful with this traction. You understand the consequences of this kind of traction, but other surgeons who have not the experience might produce the most terrible sores, which we must avoid at all cost.