Safety of Atracurium in Diabetic Patients needing Emergency Surgery

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Summary

The new relaxant drug atracurium (Tracrium) was tested in 60 severely diabetic Maltese patients needing emergency surgery. The age of this group was mostly over sixty and the type of diabetes was the N.I.D. type. Surgery was absolutely indicated as an emergency to relieve an abdominal obstruction or to remove a gangrenous limb that was causing toxaemia and threatening life. From this study the author concludes that atracurium is useful as an intubation and maintenance agent in severely diabetic patients effecting a certain, safe and predictable neuro muscular block with minimal cardio vascular disturbance and lack of cumulation enabling reversal to occur spontaneously.

Introduction

The ideal muscle relaxant agent is yet to come; but using the non depolarising drug atracurium one can achieve muscle relaxation without causing cardio vascular side effects. One must remember that atracurium is short acting, does not totally depend on liver and kidney function for its breakdown and its degradation products are free from non depolorising effects. It causes minimal side effects such as histamine release, bronchospasm and fall in blood pressure with accompanying tachycardia.[1]

The 60 patients tested had given their free consent and this project was undertaken after the Hospital Management Committee had approved the introduction of the drug atracurium and its use on Maltese patients. Thirty patients suffered from acute to subacute intestinal obstruction and the rest needed lower limb amputation.[2]

A protocol was drawn up with the approval of Welcome (U.K.) who also supplied samples of the drug for the test.

The drug was kept in an ordinary fridge and every morning only the phials that were expected to be used on that day were taken out. Any phials that remained at the end of the operating day outside the fridge were discarded. The theatre room temperature at the time of testing was kept at 20° – 22°C.

Diabetes mellitus is a very common disease in Malta and the N.I.D. type of illness is as common as 7% in the over sixties. The W.H.O. is running a study on the incidence of the disease in these islands as it is thought that the high incidence is due to inter marriage and the predominantly high carbohydrate diet.[3]

The over sixties cohort from whose rank the 60 cases studies come, lived through the rather difficult war years 1938 – 1945 when food was severely limited and carbohydrates was the only food available for the population. The commonest complication of this group of diabetic patients is vascular and this is manifested by insufficient circulation to the lower limbs. Gangrene of patient's toes often follow minor trauma and this spreads up the limb in time. Acute abdomen is a close second usually due to intestinal obstruction as these rather fat patients commonly suffer from abdominal hernia (mostly umbilical) that can cause intestinal obstruction. These patients are usually cautioned to keep to a strict dietary regimen and must take antidiabetic drugs. However once in hospital they will have plain insulin I.M. periodically and their blood tested 6 hourly to monitor the control of the glycaemia. It is to be kept in mind that what is manifested in the legs as ischaemia will also be present in the renal and hepatic arteries and arterioles and so the function of these organs is also compromised. This fact calls for use of drugs that are not 100% dependent on hepatic breakdown and renal elimination so the advent of atracurium with its Hoffman elimination method of breakdown is most welcome.[4]

These diabetic patients needing emergency surgery do not come to the theatre is an ideal acid base balance and the duty anaesthetist may have to

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anaesthetise a patient while still endeavouring to correct the acid base and electrolyte inbalance.

Patient Preparation

While being prepared for surgery the patient's blood is taken for cross matching, urea and electrolytes, glucose and haemoglobin studies. Arterial blood for acid base studies is also taken and immediate corrective measures started once the results are known. In 5 cases the results were so poor that surgery was postponed by a few hours until the corrective measures undertaken produced better results.

Adequate fluids intravenously were given and a seperate drip with 5% Dextrose and 10 units of Insulin plain perpared. A C.V.P. line was prepared to keep a vigilant watch on the cardiac function.

On arrival in the anaesthetic room the duty anaesthetist set up the monitoring equipment and gave the patient premedication intravenously. This usually consisted of Rohypnol 0.3 mg per 1 kg and atropine 0.01 mg per 1 kg. The blood pressure was checked and in the intestinal obstruction cases a nasogastric tube passed and the stomach emptied. Lumbar epidural/spinal anaesthesia is much favoured for lower limb surgery but for this trial only and after obtaining their informal consent all 60 cases had a uniform technique of neuroleptic anaesthesia with muscle relaxation using a standard gas/oxygen 60:40 and a Manley Pulmovent machine for ventilation via an E.T. tube with a TV of 600 – 800ml and a frequency of 16 ventilations per minute.

The operation

Once put on the tilted operating table and after some minutes of pre oxygenation, the patients were given thiopentone 1mg for 1kg (a sleeping dose only) and atracurium 0.5mg per 1kg immediately after in the IVI. A lignocaine 4% throat spray was administered one puff for the opharynx and one down the voice cords and trachea. The time taken to achieve relaxation prior to intubation varied from 90 seconds to 120 seconds the more experienced the anaesthetist on duty the less time needed for intubation. No case vommited during this procedure.

The additional drug used for anlgesia was only fentanyl 0.05mg doses being given as the need arose – increase in pulse rate or rise in blood pressure. Atracurium was repeated in 30 cases by time – every 20 minutes by the clock a dose of 0.25mg per 1 kg being half the initial dose – and in the other cases (30) as the need arose, the dose being the same as the above. The need for the second dose was determined by the patient's slight head or hand movements and resistance to IPPV. It was noted that if the topping up dose was not given immediately the patient's muscle power fully returned causing vigorous movements. In the 5 cases where this happened there was no recall (the premedicant drug Rohypnol has known amnesic effects).

During the operation blood was taken for acid base balance and the results were in all cases better than the ones taken before operation.

A macular rash was noticed in ten cases and this developed on the chest wall and face. There was no papule formation and the rash disappeared in a few minutes. No other side effects were noticed.

The reversal of the drug was left to occur by time alone. No atropipe or prostigmine were given to avoid any cardio vascular problems. The delay in reversal exceeded 20 minutes after the last dose in 30% of the cases studied and this was corrected by continuing intermittent positive pressure ventilation. In all cases the time for full reversal did not exceed 40 minutes after the last dose.

Conclusion

Atracurium was used in 60 diabetic patients coming for surgery. It was used for intubation only in 30 cases i.e. case of gangrene of the lower limb needing amputation and used both for intubation and maintenance in 30 other cases of intestinal obstruction. The author is not aware of a similar study on diabetic patient. In the author's opinion the drug is adequate both for intubation and maintenance and its easy reversal without the use of atropine and prostigmine make it particularly useful in patient with poor cardiac function. The histamine release encountered in some patients only did not greatly complicate matters. The blood sugar remained stable throughout the procedure. All these findings point out that atracurium can be used with safety in severe diabetic patients needing emergency surgery.

The author thanks Welcome U.K. for providing free samples of Tracurium and a working protoctol.

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