ORIGINAL ARTICLE

Is Arthroscopy of the Shoulder Safe? - A Study/Perspective on Arthroscopic Subacromial Decompression

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Summary

Fourteen fit and healthy patients underwent arthroscopic subacromial decompression (ASD) of shoulder for rotator cuff impingement. Their blood chemistry was analysed pre-operatively, 24 hours post-operatively and 2-3 weeks post-operatively. Levels of heamoglobin, haematocrit, sodium, potassium, creatinine and urea were measured. The blood chemistry returned almost to the pre-operative level at 2-3 weeks post-operatively.

There was no statistically significant differences found. This study concludes that arthroscopic subacromial decompression is a safe technique when considering the blood parameters despite the haemodilution seen in all patients.

Key Words: Arthroscopic subacromial decompression

Introduction

The technique of arthroscopic subacromial decompression (ASD) was initially reported in 1985[1]. There have been numerous articles in the literature reporting the complications of ASD [2,3] but none has looked into the possibility of "transurethral prostatic resection syndrome (TURP) equivalent" following this procedure.

The transurethral prostatic resection syndrome is well documented and reported in the urology and anaesthetic literature[4,5]. Since the surroundings of the shoulder is a well vascularised muscular area, a large amount of fluid (normally infused under pressure delivered by a pump system) is absorbed into the main circulation during and several hours after the procedure. This large amount of fluid reabsorption can potentially place the elderly and cardiovascularly-compromised patients at risk of cardiac complications.

At Wrightinghton Hospital, Wigan, United Kingdom, we carried out a prospective study to investigate the possibility of the so-called the "TURP syndrome equivalent" following ASD.

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Materials and Methods

Fourteen fit and healthy patients (9 males and 5 females) were entered into the prospective study. The aim of the study was to find out if ASD is a safe procedure when a large volume of normal saline was infused under pressure and when there was a large fluid extravasation around the shoulder joint. Patients with the history of renal or cardiac compromise, diuretic therapy or gastrointestinal upset were excluded.

All patients with the mean age of 46.3 years (Range 27 - 67) were admitted a day prior to the surgery. They stayed at least one night following the procedure so that the pre-operative and 24 hours post-operative blood samples could be obtained for analysis. The levels of haemoglobin (Hb), haemotocrit (Hct), sodium (Na), potassium (K), creatinine (Cr) and urea (U) were measured. Any episode of post-operative nausea and vomiting was recorded. The amount of anti-emetic required was also recorded. The last sample of blood was taken at two to three weeks follow-up at the outpatient department.

ASD was routinely carried out in the lateral decubitus position with the operated limb held in traction. Three standard entry portals (i.e. postero-lateral, posterior and anterior) were used. Normal saline was infused into the shoulder joint under pressure delivered by a shoulder pump system. We used the Intellijet System (by Smiths & Nephews). The pressure employed varied from 60 to 100 mm mercury. The duration of ASD procedure was recorded. The mean volume of normal saline accumulation in the patients was calculated by subtracting the total volume of normal saline collected in the suction pump bottle and in the surrounding collecting pouches of the shoulder from the total volume of normal saline infused. Any additional intravenous Hartmann solution infusion during and after ASD were also taken into account.

The results from the three blood samples were subjected to the matched paired Students' t test analysis.

Results

Table I depicts the duration of ASD procedure, the amount of normal saline infused and accumulated in the patients. The mean duration of ASD procedure was 48.4 minutes (Range 30 - 90 minutes). The mean volume of normal saline infused was 10539.6 millilitres (ml) (Range 3900 - 24000ml). The mean of estimated normal saline accumulated in the patients after ASD was 2726.9ml (Range 1375 - 5500ml). In addition, ten patients had also the intravenous Hartmann solution infusion during and after the procedure. The volume of Hartmann solution was between one and two litres.

Haematocrit (Hct) & Haemoglobin (Hb)

Table II shows that there was a fall in the serum levels of haematocrit and haemoglobin 24 hours after ASD. The mean pre-operative haematocrit level was 44.18%; 24 hours post-operative level 39.83% and at 2 weeks post-operative level 42.95%. The haematocrit levels returned to its pre-operative or near pre-operative levels at about 2 weeks.

The mean pre-operative haemoglobin level was 14.78gram/decilitres (g/dl); 24 hours post-operative level 13.46 g/dl and at 2 weeks post-operative level 14.31g/dl. The Students' t test had showed that these changes in the haematocrit and haemoglobin levels were not statistically significant.

Urea and Electrolytes

Table III summarises the mean values of pre-operative, 24 hours post-operative and 2 weeks post-operative urea and electrolytes. The general drop in the levels of urea and electrolytes within 24 hours post-operatively returned to the near normal pre-operative levels at 2 weeks. The Students' t test showed that these changes were not statistically significant.

Only one patient felt nauseated immediately after operation but he did not require any anti-emetic.

Table I

Patients	Age (Yrs)	Duration of Operation (mins)	Volume of infused Volume (ml)	Estimated volume in patients (ml)	IVI Hartmann (ml)
1	49	90	8475	1373	1000
2	28	60	3900	n/a	0
3	52	40	5780	1030	1000
4	67	45	8700	3000	1000
5	42	55	13200	3800	2000
6	51	35	6300	1475	1000
7	27	37	10500	2970	0
8	64	70	24000	5500	1000
9	33	35	9000	2400	1000
10	49	45	10500	1500	1000
11	35	35	8700	2000	0
12	50	30	10500	1500	1000
13	45	55	16500	4000	0
14	56	45	11500	4900	1000
	Mean	46.3	48.4	10539.6	2726.9

Yrs = Years
IVI = Intravenous infusion
Mins = minutes
n/a = not available

Table II

	Mean Pre-op	**Mean 24 hrs Post-op**	**Mean 2 weeks Post-op**
Haematocrit %	44.18	39.83	42.95
Haemoglobin g/dl	14.78	13.46	14.31

Table III

Electrolytes	**Mean Pre-op**	**Mean 24 hrs Post-op**	**Mean 2 weeks Post-op**
Sodium	139.1	139.2	139.4
Potassium	4.5	4.1	4.6
Creatinine	95.4	92.4	93.4
Urea	5.5	4.5	5.7

Value in mmol/l
op = operatively

Discussion

The haematocrit and haemoglobin levels dropped immediately after ASD and returned to their normal pre-operative ranges at about 2 weeks later. Since ASD is a minimally invasive procedure, haemorrhage into the shoulder joint is negligible. The main reason for the transient drop in the levels of haemotocrit and heamoglobin was due to the effect of haemodilution from the normal saline infusion. The extravasated fluid around the shoulder joint was reabsorbed into the vascular system. One patient who had had 5500 ml of estimated normal saline on board after ASD, was asymptomatic despite a big drop in the levels of haematocrit and haemoglobin. Within 2 weeks post-operatively, his haematocrit and haemoglobin levels returned to the normal ranges.

The effect of haemodilution on the serum urea and electrolytes was also observed in the study. None of the patient was clinically affected. All these blood parameters returned to the normal ranges at 2-3 weeks post-operatively because a normal kidney is able to correct any abnormal blood chemistry. None of our patients in the study had suffered from any deletrious effect from the transient change in the blood parameters studied. We have not found any haemodynamic complication following ASD.

Numerous articles have been written about the analysis of blood chemistry in order to understand the pathophysiology of TURP syndrome. Dilutional hyponaetraemia, intravascular fluid overload, congestive heart failure, transient blindness, hyperammonaemia, encephalopathy, coma and death have been reported [4,5]. Several recommendations have been made over the years on the prevention and treatment of this syndrome. As far as we have known to date, there has been no clinical paper on the possibility of similar syndrome developing after arthroscopic subacromial decompression.

It can be concluded from this prospective study that ASD is a safe technique when considering the blood parameters measured, despite the haemodilution seen in all patients. The swelling around the shoulder joint may appear alarming at first, however its absorption will not affect the patient's condition unless there is pre-existing cardiac or renal disease.

References

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