

EFFECTIVENESS OF ENDOSCOPIC INJECTION OF 2% LIGNOCAINE INTO THE BLADDER WALL TO CONTROL OBTURATOR JERK DURING TRANSURETHRAL RESECTION OF BLADDER TUMOR

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Abstract:

Purpose- To observe the efficacy of endoscopic injection of 2% lignocaine into the bladder wall at the base of tumor to control obturator jerk.

Materials and Methods- This prospective study was performed in Department of Urology, Bangabandhu Sheikh Mujib Medical University (BSMMU), National Institute of Kidney Diseases and Urology, Comfort Nursing Home (Pvt. Ltd.) and Lab Aid Specialized Hospital (Pvt. Ltd.) , Dhaka, during the period from January 2009 to December 2009. Total 90 patients were grouped into two on alternate basis. 45 patient in group-A, conducted with endoscopic injection of 2% lignocaine and another 45 patients were in group-B, conducted with nothing to control obturator jerk. Peroperative findings of both groups during transurethral resection are evaluated.

Results- In group-A, 45 patients were conducted with endoscopic injection of 2% lignocaine to control obturator jerk, 42 patients (93.3%) developed complete elimination and 3 patients (6.7%) developed partial elimination of obturator jerk. In our series overall response in complete resection of bladder tumor was 100%. In group-B patients were not conducted with 2% lignocaine injection. Statistical analysis was done and result is significant ($P<0.05$). In group-A, complete resection possible in 42 patients (93.3%) without any obturator jerk and in 3 patients (6.7%) complete resection possible with mild form of obturator jerk after endoscopic injection of 2% lignocaine. In group-B complete resection were not possible. Statistical analysis shows significant difference ($P<0.05$). In our series 37 patients (82.7%) did not need re-injection to control obturator jerk and 8 patients (17.7%) needed re-injection to control obturator jerk in group-A. Statistical analysis with group-B shows significant difference ($P<0.05$).

Conclusions- It is concluded that endoscopic injection of 2% lignocaine into the bladder wall is more effective in the management of the patient with bladder tumor who develops obturator jerk during transurethral resection of bladder tumor.

Introduction:

Bladder cancer is the second most common cancer of the genito-urinary tract, it accounts for 7% of new cancer cases in men & 2% of new cancer cases in women ¹.

Standard treatment of superficial bladder tumor is transurethral resection with intra vesical therapy. Bladder tumor whether, it is superficial or muscle invasive; Urethrocystoscopy and transurethral resection of bladder tumor would be diagnostic as well as therapeutic ². But transurethral resection of bladder tumor is not difficulties free per-operatively. One of the most important difficulties is obturator jerk that may bring disaster during the procedure. Obturator jerk is the sudden involuntary reflex contraction of adductor group of muscles due to electrical stimulation of the obturator nerve. To avoid the obturator jerk reflex, urologist often can not fully resect the tumor on the infero lateral bladder wall ³.

Obturator nerve (somatic) originates from anterior division of L2-L4 segments. From the angle between external and internal iliac vessels it runs straight to the obturator foramen, where it runs close to prostatic urethra, bladder neck and infero-lateral bladder wall ⁴.

When the bladder is distended with irrigation fluid, the obturator nerve is very close to the inferolateral bladder wall. Thus, when performing transurethral surgery, in full bladder electric current can easily stimulate the obturator nerve and activating the obturator jerk, which can suddenly push the bladder wall towards the electro-cautery blade and leads to perforation, and may even cause injury to the iliac vessels ^{5, 6}.

Although stimulation of the obturator nerve is not uncommon problem, very little have been represented in the literature about its management. Various measures available for its prevention are- (1) Spinal anesthesia, (2) Spinal plus general anesthesia, (3) Reversal of polarity, (4) Changes in the site of the inactive electrode or in current frequency, (5) Nerve cooling. But unfortunately all of the above techniques have been proven ineffective².

Naris and Hobika (1961) proposed the use of d-tubocurarine and succinyl choline to block the neuromuscular transmission during general anesthesia. However disadvantage of this was, it necessitated endotracheal intubations which was invasive and thus did not get popularity⁷. Prentis (1965) first used regional anesthesia to block the obturator nerve, and thus to block the obturator jerk during transurethral resection of bladder tumor⁸. Direct or percutaneous transvesical injection with lignocaine to the obturator canal to block the obturator jerk was used by some urologist⁹.

Junne Yih Kuo (2008) used 1% lignocaine to block obturator nerve by injecting through perineal route, but it is not easy. Here chance of obturator vascular injury is more as well as technically not always smooth. Endoscopic injections of local anesthetic (2% lignocaine) to the bladder wall is very easy and permissible procedure under direct vision for regional conduction block to prevent obturator jerk³.

Motor nerve fiber of obturator nerve contains A α fiber which is thicker in diameter. For effective obturator block, the local anesthetic conc. must exceed that for pain and temperature sensation, which are carried by thin A α and c-fiber, by two fold. Thus the concentration of lignocaine must be greater than 1% for effective motor blockade. So 2% lignocaine is the best concentration for effective nerve block. Onset of action of local anesthetic (lignocaine) is approximately 4 minutes & lasts up to 40 minutes. In adult 10-15 ml (up to 300mg) of 2% lignocaine can easily injected¹⁰.

Nerve can be easily excited by electrical or mechanical or chemical or thermal stimulus. When nerve is stimulated, it produces action potential and the depolarization wave that travels in all direction along the entire length of nerve fiber due to increase Na⁺ permeability. This conduction can easily be blocked by injection of local anesthetic (2% lignocaine) into the bladder wall that block Na⁺ Permeability¹¹.

The most important difficulties faced during transurethral resection of bladder tumor are the obturator jerk which is due to stimulation of obturator nerve by electric current. Once obturator jerk develops, it suddenly pushes the bladder and may lead to perforation⁵.

It is a common feature meets with bladder neoplasm in the lateral wall of the bladder. If we use local anesthetic (2% lignocaine) with appropriate concentration, we can easily block the nerve conduction. Endoscopic localization of bladder tumor with cystoscope is very

easy, and endoscopic injection of 2% lignocaine into the bladder wall at the base of tumor with a specialized needle is also very easy, quick and permissible procedure under direct vision for regional conduction block thus prevent the obturator jerk².

In Bangladesh no such study has been performed with injection of 2% lignocaine into the bladder wall at the base of the tumor through endoscopic route to control obturator jerk.

So this prospective study has been performed to assess the role of (endoscopic injection of 2% lignocaine into the bladder wall) this procedure to control the obturator jerk during transurethral resection of bladder tumor. Any superiority of outcome of this study will broaden the indication of this procedure to control obturator jerk reflex during transurethral resection of bladder tumor and it provides a predominant role, which can be easily provided in operation theatre with minimum or no cost for endoscopic resection of bladder tumor without disastrous hazard. This study may be the basis of further study in this field.

Materials and Methods:

This was a multicenter based prospective interventional study conducted in the Department of Urology, Bangabandhu Sheikh Mujib Medical University (BSMMU), National Institute of Kidney Diseases and Urology, Comfort Nursing Home (Pvt. Ltd.) and Lab Aid Specialized Hospital (Pvt. Ltd.), Dhaka, during the period from January 2009 to December 2009. Bladder tumor patients (Male & female) seeking treatment and peri-operatively those who developed obturator were study population. Purposive sampling technique will be applied to collect sample. Total ninety (90) patients having urinary bladder tumor were be selected according to selection criteria and divided two groups. The selection criteria were patients with bladder tumor (primary/recurrent) located on lateral bladder wall; posterior-lateral bladder wall and involving neck of bladder wall. The exclusion criteria were patients who do not give consent; patients having heart block, arrhythmia; patients with hepatic or renal function impairment; tumor located anterior or posterior or domes of the bladder; patient is known sensitive to lignocaine.

The included patient's per-operative findings (under spinal anesthesia) and all other variables were collected. Informed consent was taken. Patients were grouped into A and B. After preparation, group A was scheduled for endoscopic injection of 2% lignocaine into the bladder

wall and B-group was scheduled for nothing for control of obturator jerk. Total 90 patients were grouped into two in alternate basis. They were selected first by purposive sampling and after selection they were grouped into A and B with randomization. 45 patients were in group-A, conducted with endoscopic injection of 2% lignocaine into the bladder wall at the base of tumor and group-B was conducted with nothing. Peroperative findings of both groups during transurethral resection were evaluated. The aim of the present study is to evaluate the outcome, the per operative findings, injection site, volume of injection (2% lignocaine), necessity of re injection, response of injection, complication associated injection

Observation and Results

Total 90 patients were selected purposively accordingly to selection criteria and per operative findings are evaluated among them 45 patients were placed in group-A (where the endoscopic injection of 2% lignocaine given to control obturator jerk), and another 45 patients were given nothing to control the obturator jerk during TURBT.

Mean age for group-A was 57.28 ± 3.32 years with M: F 7:3 and for group-B was 54.51 ± 14.63 years with M:F 7.5:2.5. Age of the patients were compared and found no significant difference.

The size of base of the tumor in group-A, 22 patients (48.8%) has tumor base size <3 cm and 23 patients (51.2%) have tumor base size 3 cm or more than 3cm. In group-B, 24 patients (53.3%) have tumor base size <3 cm 21 patients (46.7%) have tumor base size 3 cm or more than 3cm. Statistical analysis done. Result shows that there is no significant difference between two groups regarding tumor base size. Calculated ± 2 value (0.177) is smaller than tabulated value (3.84) at 5% level of significance ($P > 0.05$).

Location of the tumor in group-A 37 patients (82.2%) have tumor in lateral wall of urinary bladder. Only 8 patients (17.8%) have tumor in postero lateral wall or extending up to neck of urinary bladder. On the other hand in group-B 35 patients (77.7%) have tumor in lateral wall and 10 patients (22.3%) have tumor in infero lateral wall or extending up to neck of urinary bladder. Statistical analysis done between two groups. Result shows non significant Calculated ± 2 value (0.277) is smaller than tabulated value ($P > 0.05$).

The number of tumor in group-A, 17 patients (37.7%) have single tumor and 28 patients (62.3%) have multiple tumor. In group-B, 19 patients (42.2%) have single tumor and 26 patients (57.8%) have multiple tumor. The macroscopic appearance of tumor in group A 32 patients (71.2%) have papillary tumor and 13 patients (28.8%)

have sessile tumor. In group-B, 30 patients (66.6%) have papillary tumor and 15 patients (33.3%) have sessile tumor. In group-A, 9.37% patients need re-injection in papillary group and 38.46% patients need re-injection in sessile group. After statistical analysis result shows non significant ($P > 0.05$, Table-I).

In group-A 8 patients (17.3%) need re-injection of 2% lignocaine during transurethral resection of bladder tumor and 87.7% patients need no re-injection during resection. In group-B, nothing was done and result significance. Calculated Z value (1.98) is greater than tabulated value (1.96) at 5% level of significance ($P < 0.05$).

The efficacy of 2% lignocaine in group-A, to complete elimination of obturator jerk was observed in 42 cases (93.3%) after endoscopic injection of 2% lignocaine into the bladder wall at the base of the tumor. In group-B, nothing was done and no complete elimination of obturator jerk was observed. There was a significant difference present between two groups ($P < 0.05$) and calculated Z value was 30.06 at 5% level of significance.

In group-A, partial elimination of obturator jerk was observed in 3 cases (6.7%) after endoscopic injection of 2% lignocaine into the bladder wall at the base of the tumor. In group-B, nothing was done and no partial elimination of obturator jerk was observed. There was a significant difference present between two groups ($P < 0.05$).

The Efficacy of 2% lignocaine in complete resection of tumor without jerk in group-A, macroscopically complete resection was possible in 42 patients (93.3%) without obturator jerk after endoscopic injection of 2% lignocaine into the bladder wall at the base of the tumor. In group-B, nothing was done and no complete resection was possible due to obturator jerk. There was a significant difference present between two groups ($P < 0.05$, Table-II).

The efficacy of 2% lignocaine complete resection of tumor with mild jerk in group-A, macroscopically complete resection was possible in 3 patients (6.7%) with mild form of obturator jerk after endoscopic injection of 2% lignocaine into the bladder wall at the base of the tumor. In group-B, nothing was done and no complete resection was possible due to obturator jerk. Statistical analysis was done and result was significant. ($P < 0.05$, Table-II).

The side effect of 2% lignocaine in group-A, the systemic side effects of 2% lignocaine was observed after endoscopic injection of 2% lignocaine into the bladder wall at the base of the tumor. 3 patients (6.6%) were observed mild anxiety, 2 patients (4.4%) were observed tremor and 1 patient (2.2%) was observed agitation. In group-B nothing was observed. There was no statistical significant difference between two groups ($P > 0.05$, Table III).

Table-I
Macroscopic appearance of Tumor in study groups:

Group	Total number	Papillary tumor	Patients need re-injection in papillary group	Sessile tumor	Patients need re-injection in sessile group	χ^2	P value
A	45	32 (71.2%)	3 (9.37%)	13 (28.8%)	5 (38.46%)	1.45	P>0.05
B	45	30(66.6%)	0	15 (33.3%)	0		

χ^2 - test, NS= Not significant, $\chi^2_{0.05,1} = 3.84$

Table- II
Efficacy of 2% Lignocaine in study groups

Group	No of Patients	Complete resection with out jerk				Complete resection with mild jerk			
		No.	%	Z value	P Value	No.	%	Z value	P Value
A	45	42	93.3	30.06	<0.05	3	6.7	2.90	<0.05
B	45	0	0			0	0		

Z-test, N= Significant, $Z_{0.05} = 1.96$

Table III
Side effect of 2% lignocaine.

Adverse effect	Group-A	Group-B	Calculated χ^2 value	P value
Anxiety	3 (6.6%)	0	2.90	P>0.05
Tremor	2 (4.4%)	0	1.96	P>0.05
Agitation	1 (2.2%)	0	0.989	P>0.05

χ^2 - test, NS= Not significant, $\chi^2_{0.05,1} = 3.84$

Discussion:

The present study has been designed to prove the efficacy of endoscopic injection of 2% lignocaine into the bladder wall at the base of the tumor to control the obturator jerk. Obturator jerk is one of the most common disastrous difficulties during transurethral resection. Here, sudden involuntary reflex contraction of adductor group of muscle develops due to electric stimulation of obturator nerve. Obturator nerve passes through the obturator canal, within the pelvic cavity, it runs close to prostatic urethra, bladder neck and infero lateral bladder wall. Also abnormal course or abnormal branch of obturator nerve invites the jerk during transurethral resection⁴.

About 10% patients have abnormal course of obturator nerve¹². When bladder wall distended with irrigation fluid, the obturator nerve lies very close to the lateral bladder wall. Thus when performing transurethral surgery,

electric current can easily stimulate the obturator nerve and activates the adductor muscle jerk, which can suddenly push the bladder wall towards the electro cautery blade and leads to perforation⁵.

Since 1961 different authors tried to establish different methods to control obturator jerk during transurethral resection of bladder tumor. But none of the procedure becomes ideal as these are mostly operator dependent as well as invasive, and brings another complication.

In this study no statistical significant difference was observed between the two groups in relation to age and sex. In group-A age ranges from 42-82 years with mean age SD 57.28±3.32 years with M:F 7:3 and in group-B age ranges from 40-76 years mean with SD 54.51±14.63 years with M:F 7.5:2.5. No significant difference was observed between the two groups in relation to age (P>0.05)¹.

In this study the size of base of the tumor in each group was evaluated and found that 48.8% cases had tumor base size < 3cm and 51.2% cases had tumor base size 3cm or more than 3cm in group-A and in group-B, tumor base size <3cm and 3cm or more than 3cm were in 51.3% and 46.7% cases.

Regarding location of tumor, 82.3% patients had tumor on Rt. or Lt. lateral wall and 17.8% patients had tumor on posterior lateral wall involving the neck in group-A. In group-B, tumor location on Rt. or Lt. Lateral wall and on posterior lateral wall involving the neck was 77.7% and 22.3%. After statistical analysis it was found that there is no significant difference between two groups ($P>0.05$). Observation also showed that almost all tumor producing obturator jerks were located on lateral or infero lateral wall.

Salam M.A 2002 described that 70% bladder tumor involves the lateral wall and 20% bladder tumor involves the neck (Salam. 2002). In our series this results were 82.3% and 17.8% in group-A, and in group-B were 77.7% and 22.3%¹³.

Junne YK in 2008 found that most of the tumor producing obturator jerk are located on lateral or infero lateral wall and to avoid obturator jerk urologists often do incomplete resection. Result of our study is almost similar to that study conducted by Junne YK³.

For this most of the tumor producing obturator jerk is on lateral or infero lateral wall.

In this study the number of tumor in both groups are assessed. In group-A, single number tumor were 17cases (37.7%) and multiple tumor were 28 cases (62.3%). In group-B, the single number tumor cases were 19 (42.2%) and multiple tumor were 26 cases (57.8%). Statistical analysis shows no significant difference between two groups ($P>0.05$).

Single number tumor are usually low grade bears good prognosis and less chance of stage progression and about 43% patients are cateragorized in this group¹.

In this study single number tumor in group-A was 37.7% and in group-B was 42.2%. This result was almost near to 43%. Variation of result may be due to exclusion criteria (only jerk producing tumor are included here). In our series result showed that 71.2% patients had papillary tumor and 28.8% patients had sessile tumor in group-A. In group-B, these percentages were 66.6% and 33.3%. Statistical analysis shows no significant difference present about macroscopic appearance of

tumor between two groups ($P>0.05$). According to Badrinath et al advanced tumor are 25% and superficial tumor are 50-70% in first presentation¹.

Macroscopic sessile appearance of bladder tumor is clinically advanced tumor and Papillary, single macroscopic appearance are almost clinically superficial. Here the sessile tumor in group-A and B were 28.8% and 33.3% and papillary tumor in group-A and B were 71.2% and 66.6%. Also it was observed that sessile tumor needs higher percentage of re-injection rate (38.46%) than papillary tumor (9.37%). Our findings regarding macroscopic appearance of bladder tumor were similar to Badrinath et al¹.

In this study the efficacy of 2% lignocaine are evaluated. In group-A, 45 patients were conducted with endoscopic 2% lignocaine intravesical injection at the tumor base to control obturator jerk, 42 patients (93.3%) developed complete elimination of obturator jerk and 3 patients (6.7%) partial elimination of obturator jerk. In our series overall response to complete resection of bladder tumor during transurethral procedure was 100%.

In group-B patients were not conducted with 2% lignocaine injection. Here no jerk was eliminated during procedure. Statistical analysis was done between two groups. Result shows that, there is significant difference present between two groups regarding obturator jerk elimination ($P<0.05$).

Here in group-A, complete resection possible in 42 patients (93.3%) without any obturator jerk reflex and in 3 patients (6.7%) complete resection possible with mild form of obturator jerk after endoscopic injection of 2% lignocaine. In group-B complete resection were not possible. Statistical analysis shows significant difference ($P<0.05$).

Junne et al shows that used of 2% lignocaine and electric stimulation to locate obturator nerve to inhibit the obturator jerk are better than blind anatomic approach, although its success rate is still not 100%³.

According to Augsurqer et al, with the blind anatomic approach, the effectiveness of inhibiting the obturator jerk was about 83.8%-85.7%, while with nerve stimulation, the results were superior, and according to Gasperich et al, and Kobayashi et al, the effectiveness reached 89.4%-100%⁷.

Gasperich et al, on the other hand, used the nerve stimulation approach with 0.5 mA, and 3-4 ml of 1% lignocaine was injected only once with a success rate

of 100%, while Kobayashi et al, also used nerve stimulation with 0.5 ml and injected 7-40 ml of 0.25% bupivacaine once, with success rate of 89.4%¹⁴.

In another study by Crecvy, peri prostatic and sub Vesical infiltration with 0.5 percent lignocaine done through a modified O'Conor sheath and spinal puncture needle guided by finger through per rectal route, produces effective obturator jerk control with success rate about 100%¹⁵.

In this series mild form of obturator jerk can not be eliminated after endoscopic injection of 2% lignocaine in 3 cases (6.7%). But here complete resection was possible. This may be due to abnormal branch or presence of accessory obturator nerve. In our series 37 patients (82.7%) did not need re-injection to control obturator jerk reflex and 8 patients (17.7%) needed re-injection to control obturator jerk reflex. This may be due to failure to block the conduction field by first injection. In this study no serious side effects were detected in group-A patients due to injection of 2% lignocaine. Only small group of patients developed minute adverse affect. In our series 3 patients (6.6%) developed anxiety, 2 patients (4.4%) developed mild tremor and 1 patient (2.2%) developed agitation. Statistical analysis shows no significant difference between two groups ($P>0.05$). But in our study no such complication noted. Less and mild form of side effects are due to injection of 2% lignocaine in tissue space under direct vision. This approach of injection was another important feature of this study.

This study showed a potentially important role of endoscopic injection of 2% lignocaine into the bladder wall at the base of tumor to control obturator jerk. The limitation of this study was small sample size and very large tumor are not included here with no follow up of the patient for further evaluation.

Considering the findings of the present study, it is concluded that endoscopic injection of 2% lignocaine into the bladder wall is more effective than other procedure in the management of the patient with bladder tumor who develops obturator jerk during transurethral resection of bladder tumor.

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