Intubation Outcome of Patients with Anticipated Difficult Intubation: A comparative study of Dexmedetomidine versus Sevoflurane as a Sedative

Mahmoud M. Elsayed; Samy E. Hanoura; Tamer M. Ewieda; Mahmoud E. Allam and Ashraf A.A. Abdullah

Department of Anesthesia & ICU, Faculty of Medicine (for boys), AL-Azhar University, Cairo, Egypt
Corresponding author: Mahmoud M. Elsayed; email: Elsayed_Mah234@yahoo.com

Abstract: Objectives: To evaluate the outcome of dexmedetomidine versus sevoflurane as a sedative for intubation of patients with anticipated difficult intubation. **Patients & Methods:** The study included 50 patients; 29 males and 21 females with mean age of 41.2±9.4 years and mostly proposed to have difficult intubation. All patients underwent preoperative airway assessment including the oropharyngeal view was assessed using a modified Mallampati classification. Patients were categorized into two equal groups (n=25): group D received a loading dose of dexmedetomidine (1 µg/kg) infused over 10 min and Group S inhaled sevoflurane in the sedative dose ranged between MAC of 1-1.5%. Once the desired level of sedation was achieved; a fibreoptic scope was used for tracheal intubation. Blood samples were taken for measurement of norepinephrine and adrenocorticotropic hormone (ACTH). Primary outcome included: success of fibreoptic intubation, duration till fully sedated defined as Ramsay score of 5, intubation time and procedural feasibility. Secondary outcome included assessment of patients' tolerance to intubation, occurrence adverse events one-day after surgery and impact on stress hormones. **Results:** Successful intubation was achieved in 47 patients with non-significantly higher frequency with dexmedetomidine. Despite significantly faster induction time recorded with sevoflurane; intubation time was non-significantly shorter with dexmedetomidine. The recorded intubation score in group D was significantly better than group S with higher frequency of intubation score-1 in group D. Both sedatives significantly abolished cough reflex and limb movement with non-significant difference between both groups. Twenty-six patients showed no reaction, 14 patients showed slight grimacing and only ten patients showed heavy grimacing with significant difference in favor of group D. Thirty-eight patients were cooperative, 5 patients showed minimal resistance and only 4 patients required general anesthesia immediately after intubation with significantly higher tolerance for intubation with dexmedetomidine. Seven patients developed hoarseness and/or, sore throat with non-significant difference between both groups. Patients' satisfaction scores were significantly higher satisfaction rate with dexmedetomidine. Both drugs induced significant blunting of plasma levels of noradrenaline and ACTH in response to intubation with non-significant difference between both groups. **Conclusion**: Both drugs could be used as a sedative modality for fibreoptic intubation of patients with anticipated difficult intubation, but the reported better intubation scores with dexmedetomidine is a point for its use.

[Mahmoud M. Elsayed; Samy E. Hanoura; Tamer M. Ewieda; Mahmoud E. Allam and Ashraf A.A. Abdullah. **Intubation Outcome of Patients with Anticipated Difficult Intubation: A comparative study of Dexmedetomidine versus Sevoflurane as a Sedative.** *J Am Sci* 2012;8(9):43-48]. (ISSN: 1545-1003). http://www.jofamericanscience.org. 6

Keywords: Difficult intubation, Sevoflurane, Dexmedetomidine, Fiberoptic intubation

1. Introduction

Airway management is a major responsibility for the anesthesiologist. Difficulties with tracheal intubation significantly contribute to the morbidity and mortality associated with anesthesia. Identifying situations and patients at frequent risk for airway management problems is a key to optimal care and has been the focus of numerous publications [(1)].

The difficult airway, although rare, still occurs with a frequency sufficient to require that all personnel associated with airway management be familiar with methods to use when confronted with a challenging airway [(2)]. The difficulty of achieving a patent airway varies with anatomic and other individual patient factors, and identification of the patient with a difficult airway is vital in planning anesthetic management so that endotracheal intubation and positive pressure ventilation can be achieved safely [(3)].

Fibreoptic nasotracheal intubation is an effective technique for the management of patients with difficult airways. Both optimal intubating conditions and patient comfort are paramount while preparing the patient for fibreoptic intubation. One challenge associated with this procedure is to provide adequate sedation while maintaining a patent airway and ensuring ventilation. An ideal sedation regimen would provide patient comfort, blunting of airway reflexes, patient cooperation, hemodynamic stability, amnesia and the maintenance of a patent airway with spontaneous ventilation [(4, 5)].

The current prospective comparative study aimed to evaluate the outcome of dexmedetomidine versus sevoflurane as a sedative modality for intubation of patients with anticipated difficult intubation.

2. Patients and Methods

The present comparative prospective study was conducted at Department of Anesthesia, Doha Clinic Hospital. After obtaining a written fully informed patients' consent, 50 ASA II-III patients assigned for varied surgical procedure and mostly proposed to have difficult intubation. Patients were categorized into two equal groups (n=25) according to sedation modality used during fibreoptic nasotracheal intubation: Group S assigned to receive sevoflurane and Group D assigned to dexmedetomidine.

All patients underwent preoperative airway assessment including measurement of the inter-incisor gap (IG) and mandible luxation (ML) using 3 levels: IG<3.5 cm and negative ML, IG=3.5-5 and negative ML or IG >5cm or positive ML, [6]. Thyromental distance (TMD) was measured and categorized as >6.5 cm, 6.0-6.5 cm, or <6.0 cm, [7]. The maximum range of head and neck movement was assessed and classified as >90°, 80-90° or <80° [8]. The oropharyngeal view was assessed using a modified Mallampati classification as (a) good visualization of the soft palate, fauces, uvula, and tonsillar pillars; (b) pillars obscured by the base of the tongue but the soft palate, fauces, and uvula visible; (c) soft palate and base of the uvula visible; and (d) soft palate not visible, [9, 10].

In the operating room, an intravenous cannula was inserted, and a continuous infusion (crystalloid solution) was started and all patients were non-invasively monitored with electrocardiogram (ECG), non-invasive blood pressure measurement, and pulse oximetry (Sp_{O2}). Patients in the dexmedetomidine group received a loading dose of dexmedetomidine (1 µg/kg) infused over 10 min. The infusion was prepared by the addition of 200 µg (2 ml) of dexmedetomidine to 48 ml of 0.9% saline solution in a 50-ml syringe. Sevoflurane was inhaled in the sedative dose ranged between MAC of 1-1.5%.

Once the desired level of sedation was achieved; a fibreoptic scope (Olympus ENF XP 4.5 mm; Olympus, Tokyo, Japan) was loaded with a 7.0-mm tracheal tube for male patients or 6.5-mm tube for females. Once the glottic structures were identified, 2 ml lidocaine 2% was sprayed directly onto the glottis via the working channel of the fibreoptic scope and another 2 ml lidocaine 2% was then sprayed below the vocal cords. Once tracheal intubation was complete and the nasotracheal tube was secured, general anesthesia was administrated.

Blood samples were taken for measurement of norepinephrine and adrenocorticotropic hormone (ACTH). Samples were collected prior to induction of anesthesia (T1), and immediately before (T2) and after (T3) intubation. Obtained blood samples were immediately placed into iced water, cool-centrifuged within 15 min, and stored at -25 °C until further analysis at hospital lab.

Primary outcome of the study included the following items: success or failure of fibreoptic intubation, duration till fully sedated defined as Ramsay score of 5 (i.e. a sleep, has a sluggish response to a light glabellar tap or loud auditory stimulus) [11], intubation time defined as time taken from inserting the fibreoptic scope to confirmation of nasotracheal intubation and sum of sedation and intubation times was defined as procedural duration. Procedural feasibility was assessed through scoring of the following items: Intubation scoring was assessed by vocal cord movement and scored as 1 = open, 2 = moving, 3 = closing, 4 = closed), coughing was scored as 1 = none, 2 = slight, 3 = moderate, 4 =severe and limb movement was scored as 1 = none, 2 = slight, 3 = moderate, 4 = severe, patient tolerance was assessed by a 5-point fibreoptic intubation comfort score as follows: 1 = no reaction, 2 = slight grimacing, 3 = heavy grimacing, 4 = verbal objection, 5 = defensive movement of head or hands.

Secondary outcome of the study included assessment of patients' tolerance to intubation, immediately after nasotracheal intubation, using a 3-point score: 1 = cooperative, 2 = restless ⁄ minimal resistance, 3 = severe resistance ⁄ general anesthesia required immediately. One-day after surgery patients were assessed for occurrence adverse events including hoarseness, sore throat and for satisfaction score as follows 1 = excellent, 2 = good, 3 = fair, 4 = poor. As an additional outcome, the impact of both modalities on stress hormones was evaluated.

Statistical analysis

Obtained data were presented as mean±SD and ranges. Results were analyzed using Wilcoxon ranked test for unrelated data (Z test) and Chi-square test (X^2 test). Statistical analysis was conducted using the SPSS (Version 15, 2006) for Windows statistical package. *P* value <0.05 was considered statistically significant.

3. Results

The study included 50 patients; 29 males and 21 females with mean age of 41.2±9.4; range: 23-54 years. Patient's demographic data and airway assessment data showed non-significant difference between both studied groups, (Tables 1 & 2).

Successful intubation was achieved in 47 patients (93%); 23 patients (92%) in group S and 24 patients (96%) in group D with non-significantly higher frequency of successful intubation with dexmedetomidine, (X^2=1.569, p>0.05). Despite the significantly (Z=2.406, p=0.016) faster induction time recorded with sevoflurane compared to dexmedetomidine; intubation time was non-significantly (Z=1.270, p>0.05) shorter with dexmedetomidine compared to sevoflurane with non-significantly (Z=1.089, p>0.05) longer total procedural time in group D compared to group S, (Fig. 1).

Also, the recorded intubation score in group D was significantly better than that reported for group S with higher frequency of intubation score 1 in group D, (X^2=3.579, p<0.05). However, both sedatives significantly abolished cough reflex and limb movement with non-significant difference between both groups. As regards patients' reaction to intubation; 26 patients (52%) showed no reaction, 14 patients (28%) showed slight grimacing and only ten patients showed heavy grimacing with significant difference (X^2=5.144, p<0.05) in favor of group D. Out of the 47 patients had successful intubation; 38 patients (80.9%) were cooperative, 5 patients (10.6%) showed minimal resistance and only 4 patients (8.5%) required general anesthesia immediately after intubation with significantly (X^2=3.617, p<0.05) higher tolerance for intubation with dexmedetomidine.

One-day after surgery; only 7 patients (14.9%) developed hoarseness and/or, sore throat with non-significant (X^2=0.896, p>0.05) difference between both groups. As regards patients' satisfaction for the modality of sedation used; 35 patients (%) found it excellent, 8 patients found it good and 4 patients found it fairly satisfying with significantly (X^2=5.181, p<0.05) higher satisfaction rate with dexmedetomidine.

Both sevoflurane and dexmedetomidine induced significant (p<0.05) blunting of plasma levels of nor-adrenaline and ACTH before intubation compared to baseline levels. Immediately after intubation, both drugs blunted the response to intubation with maintained plasma nor-adrenaline and ACTH levels compared to baseline levels with non-significant increase compared to levels estimated before intubation. In comparison to sevoflurane, dexmedetomidine non-significantly lowered plasma nor-adrenaline and ACTH before and after intubation (Table 3).

Table (1): Patients' demographic data

			Group S	Group D	Total
Age	Strata	<30 years	4 (16%)	5 (20%)	1 (3.3%)
		30-40	4 (16%)	7 (28%)	6 (20%)
		>40-50	11 (44%)	8 (32%)	13 (43.4%)
		>50-60	6 (24%)	5 (22%)	10 (33.3%)
	Total		42±9.2 (23-53)	40.3±9.6 (24-54)	41.2±9.4 (23-54)
Gender	Male		14 (56%)	15 (60%)	29 (58%)
	Female		11 (44%)	10 (40%)	21 (42%)
Body weight (Kg)			79.3±8.1 (68-92)	84.7±4.5 (78-90)	82±7.1 (68-92)
Body height (cm)			164.7±6.8 (153-175)	168.7±1.7 (167-175)	166.7±5.3 (153-175)
BMI (Kg/m^2)	Strata	≤25 Kg/m^2	1 (4%)	0	1 (3.3%)
		>25-30 Kg/m^2	11 (44%)	11 (44%)	12 (40%)
		>30 Kg/m^2	13 (52%)	14 (56%)	14 (567%)
	Total		29.3±2.8 (22.9-33.3)	29.6±1.9 (25.8-31.9)	29.5±2.3 (22.9-33.3)
Neck length	Normal		20 (80%)	21 (84%)	41 (82%)
	Short		5 (20%)	4 (16%)	9 (18%)
Teeth	Normal		22 (88%)	21 (84%)	43 (86%)
	Abnormal		3 (12%)	4 (16%)	7 (14%)

Data are presented as mean±SD & numbers; ranges & percentages are in parenthesis

Table (2): Airway assessment data

Parameter	Scoring	Group S	Group D
Inter-incisor gap (cm)	IG<3.5	20 (80%)	19 (78%)
	IG=3.5-5	3 (12%)	5 (20%)
	IG>5	2 (8%)	1 (4%)
Thyromental distance (cm)	TMD>6.5	7 (48%)	13 (52%)
	TMD=6-6.5	8 (32%)	5 (20%)
	TMD<6	5 (20%)	7 (28%)
Angle of head & neck movement	>90^o	17 (68%)	14 (56%)
	80-90^o	6 (24%)	8 (32%)
	<80^o	2 (8%)	3 (12%)
Mallampati scoring	Class A	9 (36%)	10 (40%)
	Class B	11 (44%)	9 (36%)
	Class C	3 (12%)	5 (20%)
	Class D	2 (8%)	1 (6.7%)

Data are presented as numbers; percentages are in parenthesis

Table (3): Intubation data

Parameter	Scoring	Group S	Group D	Statistical difference
Success rate	Successful	23 (92%)	24 (96%)	X^2=3.579, p<0.05
	Unsuccessful	2 (8%)	1 (4%)	
Procedural time (sec)	Sedation time (sec)	162.2±27.1 (120-210)	181.2±36.5 (135-250)	Z=2.406, p =0.016
	Intubation time (sec)	266.6±48.4 (200-400)	250.4±50.1 (175-360)	Z=1.270, p >0.05
	Total (sec)	428.8±46.6 (375-525)	431.6±52 (335-540)	Z=1.089, p >0.05
Intubation scoring	1:2:3:4	19:4:2:0	22:2:1:0	X^2=3.579, p <0.05
Cough scoring	1:2:3:4	16:5:3:1	19:4:2:0	X^2=1.387, p >0.05
Limb movement	1:2:3:4	16:6:3:0	19:4:2:0	X^2=1.193, p <0.05
Patient's reaction	1:2:3:4	12:6:5:2	14:8:2:1	X^2=5.144, p <0.05
Patient's tolerance	Cooperative	18 (76%)	20 (80%)	X^2=3.617, p <0.05
	Minimal resistance	3 (12%)	2 (8%)	
	Immediate GA	2 (8%)	2 (8%)	
	Failed intubation	2 (8%)	1 (4%)	
Adverse effects	No	4 (17.4%)	3 (12.5%)	X^2=0.896, p >0.05
	Yes	19 (82.6%)	21 (87.5%)	
Patients' satisfaction	Satisfactory	17 (74%)	18 (75%)	X^2=5.181, p <0.05
	Good	3 (13%)	5 (20.8%)	
	Fair	3 (13%)	1 (4.2%)	
	Poor	0	0	

Data are presented as mean±SD, ratios & numbers; ranges & percentages are in parenthesis

Table (3): Stress hormone data

Parameter	Scoring	Group S	Group D
Nor-adrenaline (pg/ml)	T1	201.5±44 (120-210)	204.2±36.9 (153.8-265.7)
	T2	160.2±35.7 (94.7-207.2) *	153.4±39.3 (98.6-202.4)*
	T3	190.5±36 (102.3-241.5)	170.2±30.8 (99.4-215.7)*
ACTH (pg/ml)	T1	17.97±4 (12-26.2)	18.82±3.9 (13.55-26.9)
	T2	13.07±2.5 (9.4-18.9)*	12.24±2.5 (8.7-17.2)*
	T3	14.52±3.3 (10.6-21.7)*	13.86±3.9 (9.1-207.2)*

Data are presented as mean±SD, ratios & numbers; ranges & percentages are in parenthesis

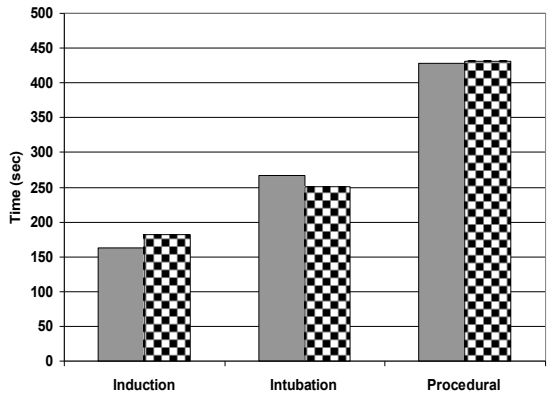

Fig. (1): Mean times till successful intubation recorded in both groups

4. Discussion

The performance of fiberoptic intubation in cases with anticipated difficult intubation where re-interventions are expected is a challenging for the anesthetist. In such circumstances the anesthetist is playing between two extremes to achieve two opposite goals, considering such patient is sedated, the liability for developing obstruction and/or hypoxemia is a dramatic outcome which must be avoided with rapid and successful intubation and on the other side the attempt of intubation must be successful in one shoot without excessive stress, pain and with lowest possibility for re-attempting.

Successful fiberoptic intubation was achieved in a 94% of studied patients during the first attempt, 6% of studied patients required a second attempt; considering single attempt as a successful outcome, thus the current study presents a procedural success rate of 94% with non-significant difference between both modalities of sedation.

The reported success rate for 1st attempt for sevoflurane (92%) as sedation modality for fiberoptic intubation coincided with several previous similar studies; ***Drolet*** [12] documented that in certain cases with anticipated difficult intubation, a sevoflurane induction may be chosen to test the efficacy of a supraglottic device while simultaneously maintaining spontaneous ventilation. ***Péan et al.*** [13] reported a success rate for sevoflurane of 90% versus 97% for propofol for fiberoptic intubation for patients with anticipated difficult intubation. ***Tan et al.*** [14] compare the effect of sevoflurane and propofol in combined anesthesia induction with remifentanil for tracheal intubation fibreoptic bronchoscope and reported no significant difference between both modalities for induction for fiberoptic bronchoscope.

In hand with the applicability of sevoflurane for facilitating intubation, multiple studies approved its efficacy in special situation of difficult intubation; ***Taguchi et al.*** [15] reported successful fiberoptic tracheal intubation of a patient with Hunter syndrome which is a hereditary disorder caused by accumulation of glycosaminoglycans and anesthesia in affected individuals is hampered by airway management because of gargoylism. ***Okuno et al.*** [16] recommended sevoflurane and remifentanil anesthesia for patients with difficult intubation in patients with Stickler's syndrome which is an autosomal multisystem disorder with mandibular hypoplasia which causes difficulties in mask ventilation and endotracheal intubation. ***Górnik-Właszczuk et al.*** [17] successfully tried sevoflurane for intubation of a patient with arthrogryposis which is a rare congenital syndrome, characterized by multiple joint contractures with problems which may be encountered as difficult airway and myopathy

Dexmedetomidine provided significantly better intubation condition that facilitated intubation and manifested as significantly higher intubation score and patients' cooperation with significantly lower scores of patients' reaction to intubation. Moreover, patients' satisfaction scores with using dexmedetomidine as sedation modality for intubation were significantly better compared to sevoflurane. The only disadvantage was the significantly longer induction time to achieve the desired level of sedation appropriate for intubation.

In line with the success rate reported with dexmedetomidine; ***Bergese et al.*** [18] evaluated dexmedetomidine as the primary sedative for awake fiberoptic intubation and reported that more Mallampati Class IV patients treated with dexmedetomidine were successfully intubated without midazolam than with placebo and concluded that dexmedetomidine is effective as the primary sedative in patients undergoing awake fiberoptic intubation. ***Kunisawa et al.*** [19] used target-controlled infusion of dexmedetomidine for awake intubation under sedation in 5 patients who had a risk of pulmonary aspiration or difficult airway and reported that conditions at laryngoscopy were excellent in all cases, and conditions at tracheal intubation were good except in 1 case; reflex to intubation was preserved in all cases and patients had no memory of discomfort and/or intubation.

Boyd & Sutter [20] documented that dexmedetomidine sedation is advocated for use in awake fiberoptic intubation of patients with cervicofacial infections and difficult airways because of its ability to provide sedation, analgesia, reversible anterograde amnesia, and anxiolysis without impairment of protective reflexes, respiratory depression, or hemodynamic compromise. ***Madhere et al.*** [21] presented a case report of a patient with a critical airway who had a true documented allergy to

local anesthetics and reported that dexmedetomidine appeared to be useful for sedation during awake intubations in critical airways, without the need for airway topicalization and its ability to act as a sedative, anxiolytic, analgesic, and antisialagogue without causing respiratory depression is promising to the field of anesthesiology.

Unfortunately, review of literature showed no comparative study including sevoflurane and dexmedetomidine to compare outcome of the current study; however, out of the obtained results, it could be concluded that both sevoflurane and dexmedetomidine could be used as a sedative modality for fibreoptic intubation of patients with anticipated difficult intubation, but the reported better intubation scores with dexmedetomidine is a point for its use

Corresponding author
Mahmoud M. Elsayed
Department of Anesthesia & ICU Faculty of Medicine (for boys), AL-Azhar University, Cairo, Egypt

References

1. Auroy Y, Benhamou D, Péquignot F, Bovet M, Jougla E, Lienhart A: Mortality related to anaesthesia in France: analysis of deaths related to airway complications. Anaesthesia; 64(4):366-70, 2009.
2. George E, Haspel KL: The difficult airway. Int Anesthesiol Clin.; 38(3):47-63, 2000.
3. Siyam MA, Benhamou D: Difficult endotracheal intubation in patients with sleep apnea syndrome. Anesth Analg.; 95(4):1098-102, 2002.
4. Andruszkiewicz P, Dec M, Kański A, Becler R: Awake fibreoptic intubation. Anestezjol Intens Ter. 2010; 42(4):218-21.
5. Yepes Temiño MJ, Panadero Sánchez A, Callejas González R, Carrascosa Moreno F, Pérez Valdivieso JR: [An awake fiberoptic intubation protocol: descriptive retrospective assessment of safety and efficacy]. Rev Esp Anestesiol Reanim. 2011; 58(2):80-4.
6. Aiello G, Metcalf I. Anaesthetic implication of temporomandibular joint disease. Can J Anaesth; 39:610–6, 1992.
7. Lewis M, Keramati S, Benumof JL, Berry CC: What is the best way to determine oropharyngeal classification and mandibular space length to predict difficult laryngoscopy? Anesthesiology; 81:69 –75, 1994.
8. Wilson ME, Spiegelhalter D, Robertson JA, Lesser P. Predicting difficult intubation. Br J Anaesth; 61: 211–6, 1988
9. Mallampati SR, Gatt SP, Gugino LD, *et al.* A clinical sign to predict difficult tracheal intubation: a prospective study. Can Anaesth Soc J;32:429 –34, 1985.
10. Samsoon GLT, Young JRB. Difficult tracheal intubation: a prospective study. Anaesthesia; 42:487–90, 1987.
11. Ramsay MA, Savege TM, Simpson BR, Goodwin R (1974): Controlled sedation with alphaxalone-alphadolone. BMJ; 2: 656–9.
12. Drolet P: Management of the anticipated difficult airway--a systematic approach: continuing Professional Development. Can J Anaesth. 2009; 56(9):683-701.
13. Péan D, Floch H, Beliard C, Piot B, Testa S, Bazin V, Lejus C, Asehnoune K: Propofol versus sevoflurane for fiberoptic intubation under spontaneous breathing anesthesia in patients difficult to intubate. Minerva Anestesiol. 2010; 76(10):780-6.
14. Tan HY, Cao LH, Huang W, Zhong ZJ, Lin WQ, Zeng WA: [Comparison of sevoflurane and propofol in combined anesthesia induction with remifentanil for tracheal intubation with fiberoptic bronchoscope]. Nan Fang Yi Ke Da Xue Xue Bao. 2010; 30(8):1857-9.
15. Taguchi S, Kusunoki S, Fukuda H, Hamada H, Kawamoto M: Difficult tracheal intubation using airway scope in a pediatric patient with Hunter syndrome. Masui. 2009; 58(10):1278-81.
16. Okuno E, Miyata Y, Uemura T, Saikawa S, Noguchi N, Fuchibe M, Sugahara K: Anesthetic management of a patient with Stickler's syndrome. Masui. 2010; 59(5):629-31.
17. Górnik-Właszczuk E, Majewski J, Szczygieł R, Kurak J: Anaesthesia in patients with arthrogryposis. Anestezjol Intens Ter. 2011; 43(2):90-2.
18. Bergese SD, Patrick Bender S, McSweeney TD, Fernandez S, Dzwonczyk R, Sage K: A comparative study of dexmedetomidine with midazolam and midazolam alone for sedation during elective awake fiberoptic intubation. J Clin Anesth. 2010; 22(1):35-40.
19. Kunisawa T, Nagashima M, Hanada S, Suzuki A, Takahata O, Iwasaki H: Awake intubation under sedation using target-controlled infusion of dexmedetomidine: five case reports. J Anesth. 2010; 24(5):789-92.
20. Boyd BC, Sutter SJ: Dexmedetomidine sedation for awake fiberoptic intubation of patients with difficult airways due to severe odontogenic cervicofacial infections. J Oral Maxillofac Surg. 2011; 69(6):1608-12.
21. Madhere M, Vangura D, Saidov A: Dexmedetomidine as sole agent for awake fiberoptic intubation in a patient with local anesthetic allergy. J Anesth. 2011; 25(4):592-4.

7/7/2012