UDC 616.212-007.2-089.844-089.5-074:615.214 https://doi.org/10.26641/2307-0404.2019.2.170130

A.A. Ayvardgi

FEATURES OF CHANGES IN LABORATORY PARAMETERS OF PATIENTS AGAINST THE USE OF DEXMEDETOMIDINE IN SEPTOPLASTY

SE «Dnipropetrovsk medical academy of Health Ministry of Ukraine»
Department of Anesthesiology and Intensive Care
V. Vernadsky str., 9, Dnipro, 49044, Ukraine
Dnipropetrovsk City Clinical Hospital N 8
Kosmichna, 19, Dnipro, 49000, Ukraine
ДЗ «Дніпропетровська медична академія МОЗ України»
кафедра анестезіології та інтенсивної терапії
(зав. – д. мед. н., проф. Ю.Ю. Кобеляцький)
вул. В. Вернадського, 9, Дніпро, 49044, Україна
КЗ «Міська клінічна лікарня № 8» ДМР
(в.о. головн. лікаря – В.Л. Бородуля)
вул. Космічна, 19, Дніпро, 49000, Україна
e-mail: ayvardgi@gmail.com

Цитування: Медичні перспективи. 2019. Т. 24, № 2. С. 46-51
Cited: Medicni perspektivi. 2019;24(2):46-51

Key words: *septoplasty, perioperative period, anemia, systemic inflammatory response, hemostasis, blood loss, dexmedetomidine*
Ключові слова: *септопластика, періопераційний період, системна запальна відповідь, анемія, гемостаз, крововтрата, дексмедетомідин*
Ключевые слова: *септопластика, периоперационный период, системный воспалительный ответ, анемия, гемостаз, кровопотеря, дексмедетомидин*

Abstract. Features of changes in laboratory parameters of patients against the use of dexmedetomidine in septoplasty. Ayvardgi A.A. *Currently, a lot of attention of scientists all over the world is paid to the perioperative management strategy, taking into account the volume of surgical intervention, the presence of comorbidities and their possible complications. This makes it possible to reduce mortality, decrease the number of adverse events in the intra- and postoperative period, effectively cope with pain, advance recovery and rehabilitation, and also increase patients' satisfaction with the quality of medical care. We studied indices of 58 adult patients who underwent septoplasty. Patients were divided into 2 groups. In group "D", dexmedetomidine was infused, which began 10 minutes before the induction of anesthesia at a dose of 0.7 μg/kg/h and ended 10 minutes before the end of the surgical intervention. The clinical blood test (hemoglobin level, erythrocytes, leukocytes, stabs count), body temperature of patients, coagulogram (INR, fibrinogen level, Duke bleeding time) were studied. When comparing the indicators of clinical analysis in the postoperative period in the control group leukocytosis and stab left shift ($p<0.001$) was observed. For patients undergoing dexmedetomidine infusion, leukocyte and bacillus levels were normal. In both postoperative follow-up groups, low-grade fever was detected ($p<0.001$). In the control group, 12 hours after surgery, body temperature rose to febrile values. During the operative intervention, the "D" group was characterized by the better indices of blood coagulation. In the group "K" on the second day of the postoperative period, there was a slight increase in coagulation. The level of intraoperative blood loss in the "D" group was significantly lower than in the control group ($p<0.001$). In the "D" group in the postoperative period, the minimum decrease in hemoglobin was determined in contrast to the control group ($p<0.001$). The use of dexmedetomidine infusion leads to a decrease in the manifestations of a systemic inflammatory response in surgical interventions for the curvature of the nasal septum. The introduction of dexmedetomidine provides better blood coagulation during septoplasty. Infusion of dexmedetomidine causes a decrease in blood loss and consequently the maintenance of hemoglobin concentration at the proper level.*

Реферат. Особенности изменения лабораторных показателей пациентов на фоне применения дексмедетомидина при септопластике. Айварджи А.А. *В настоящее время большое внимание ученых во всем мире уделяется периоперационной стратегии ведения пациентов с учетом объёма оперативного вмешательства, наличия сопутствующих патологий и их возможных осложнений. Это позволяет снизить летальность, уменьшить количество нежелательных явлений в интра- и послеоперационном периоде,*

эффективно справиться с болью, ускорить сроки выздоровления и реабилитации, а также повысить удовлетворенность больных качеством медицинской помощи. В работе изучались показатели 58 взрослых пациентов, которым проводилась септопластика. Больные разделены на 2 группы. В группе «Д» больным проводилась инфузия дексмедетомидина, которая начиналась за 10 мин. до индукции анестезии в дозе 0,7 мкг/кг/ч и заканчивалась за 10 мин. до завершения оперативного вмешательства. Исследовались общеклинический анализ крови (уровень гемоглобина, эритроцитов, лейкоцитов, палочек), температура тела больных, коагулограмма (МНО, уровень фибриногена, время кровотечения по Дюке). При сравнении показателей общеклинического анализа в послеоперационном периоде в контрольной группе наблюдался лейкоцитоз и палочкоядерный сдвиг влево (p<0,001). Для пациентов, которым проводилась инфузия дексмедетомидина, был характерен уровень лейкоцитов и палочек в пределах нормы. В обеих группах наблюдения в послеоперационном периоде определялась субфебрильная лихорадка (p<0,001). В контрольной группе через 12 ч. после оперативного вмешательства температура тела повышалась до фебрильных значений. В течение оперативного вмешательства группа «Д» характеризовалась лучшими показателями коагуляции крови. В группе «К» на вторые сутки послеоперационного периода наблюдалось незначительное усиление коагуляции. Уровень интраоперационной кровопотери в группе «Д» достоверно меньше, чем в контрольной (p<0,001). В группе «Д» в послеоперационном периоде определялось минимальное снижение гемоглобина, в отличие от контрольной группы (p<0,001). Использование инфузии дексмедетомидина приводит к уменьшению проявлений системного воспалительного ответа при оперативных вмешательствах по поводу искривления носовой перегородки. Введение дексмедетомидина обеспечивает лучшие показатели свертывания крови в течение септопластики. Инфузия дексмедетомидина обуславливает уменьшение кровопотери, следовательно и сохранение концентрации гемоглобина на должном уровне.

Recently, considerable attention of scientists around the world is given to the perioperative management of surgical patients, taking into account the volume of surgical intervention, the presence of concomitant pathologies and their possible complications [1].

During various surgical interventions, there is a risk of inflammatory complications that include infection, systemic inflammatory response syndrome (SIRS) or sepsis [5].

A promising direction in improving perioperative management of patients is the use of dexmedetine in the form of anesthetic support for intravenous infusion.

This substance is an agonist of the central and peripheral α-2 adrenergic receptors. In various studies, it has been shown that it reduces the level of proinflammatory cytokines in experimental sepsis, improves cellular immune function, reduces systemic inflammatory response, the frequency of infectious complications in patients in critical condition and in patients in the postoperative period [3, 4, 9, 11].

It was shown that infusion of dexmedetidine resulted in a decrease in systemic inflammatory response in cardiac surgical interventions with extracorporeal circulation [6].

In addition, in using dexmedetine in various surgical interventions, there was a decrease in intraoperative blood loss and improved visual field performance [7, 12].

In the dissertation work of Japanese scientists it was demonstrated that dexmedetomidine both exacerbated and inhibited platelet function in vitro or did not affect their function at all. The effect of gain is mediated by the effect on α-2-adrenergic receptors [8, 10].

Thus, according to the literature data, the use of dexmedetine in various fields of surgery makes it possible to reduce the systemic inflammatory response and reduce intraoperative blood loss, which requires a more detailed study of surgical interventions for deflected nasal septum.

The purpose of the study was to investigate the features of the hemostatic system, general blood clotting and body temperature in dynamics in patients with septoplasty with the use of dexmedetomidine infusion.

MATERIALS AND METHODS OF RESEARCH

In this research we studied findings of 58 adult patients with deflected nasal septum which were operated in 2017-2018 on the basis of CE "Dnipropetrovsk City Clinical Hospital No. 8" DRC and divided into 2 groups (Table 1).

Patients underwent septoplasty under combined anesthesia: total intravenous anesthesia with artificial ventilation of the lungs + local anesthesia.

Table 1

Characteristic of patients in the research groups

Characteristic	K	D
Number of patients	28	30
Gender (m/f)	14/14	13/17
Age	37	33
Class by ASA	I-II	I-II

In group "D" an intravenous infusion of dexmedetine was performed, which began in 10 minutes before induction of anesthesia in a dose of 0.7 μg / kg / h and ended in 10 minutes. until the completion of surgery. The hemodynamic parameters were determined on the basis of the registration of the plethysmogram with the help of the monitor "Utas - UM - 300", followed by the calculation of mathematical formulas [2].

The obtained data were processed with parametric and nonparametric statistics using STATISTICA program 10.

To perform the study the permission of the Ethics Commission of the CE "DCCH N 8" DRC and SE "DMA of Health Ministry of Ukraine" was obtained and the voluntary consent of all patients complying with the principles of the Helsinki Declaration.

RESULTS AND DISCUSSION

When comparing the indices of general-clinical blood test between the follow-up groups in the postoperative period, in the control group leukocytosis and a left shift of stab cells ($p<0.001$) was noted (Table 2). For patients treated with dexmedetinein infusion, leukocytes and stab cells were found to be within normal limits.

Subfebrile fever ($p<0.001$) was determined in both groups of postoperative follow-up. In the control group 12 hours after surgery, body temperature increased to febrile values (Fig. 1).

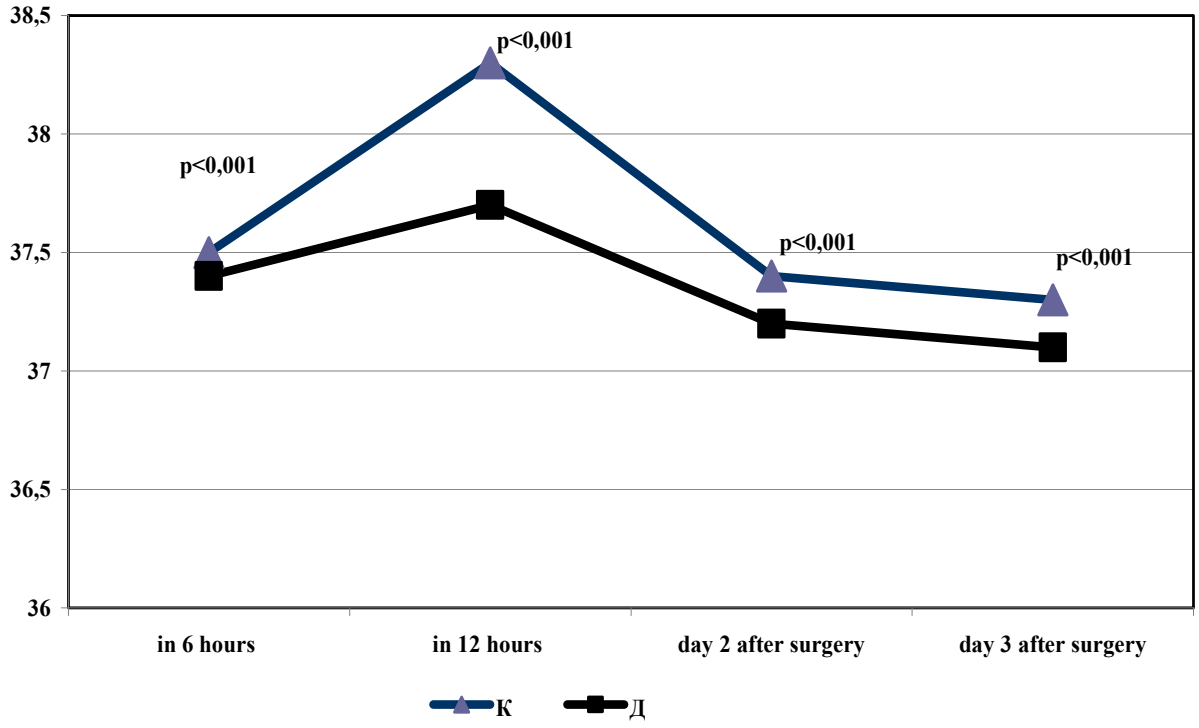

Fig. 1. Dynamics of body temperature in the postoperative period

On day 2 after surgery in the group "K" hyperfibrinogenemia was observed ($p<0.001$). INR in group "D" at the stage of surgical intervention was slightly lower than in the control group. In the group "K" in 2 days after the surgery, the APTT values were lower than in the group "D" ($p<0.001$). Bleeding time by Duke in group "D" was significantly less than in the control group during and after completion of surgery ($p<0.001$).

Thus, during the surgical intervention, the group "D" was characterized by better indices of blood clotting. In the group "K" on day 2 of the postoperative period there was a slight increase in coagulation, which may be due to manifestations of systemic inflammatory reaction after surgery.

The level of intraoperative blood loss in the group "D" was significantly lower than in the control ($p<0.001$) (Fig. 2).

In group “D” in the postoperative period there was noted minimal decrease in hemoglobin level, compared to the control group ($p<0.001$).

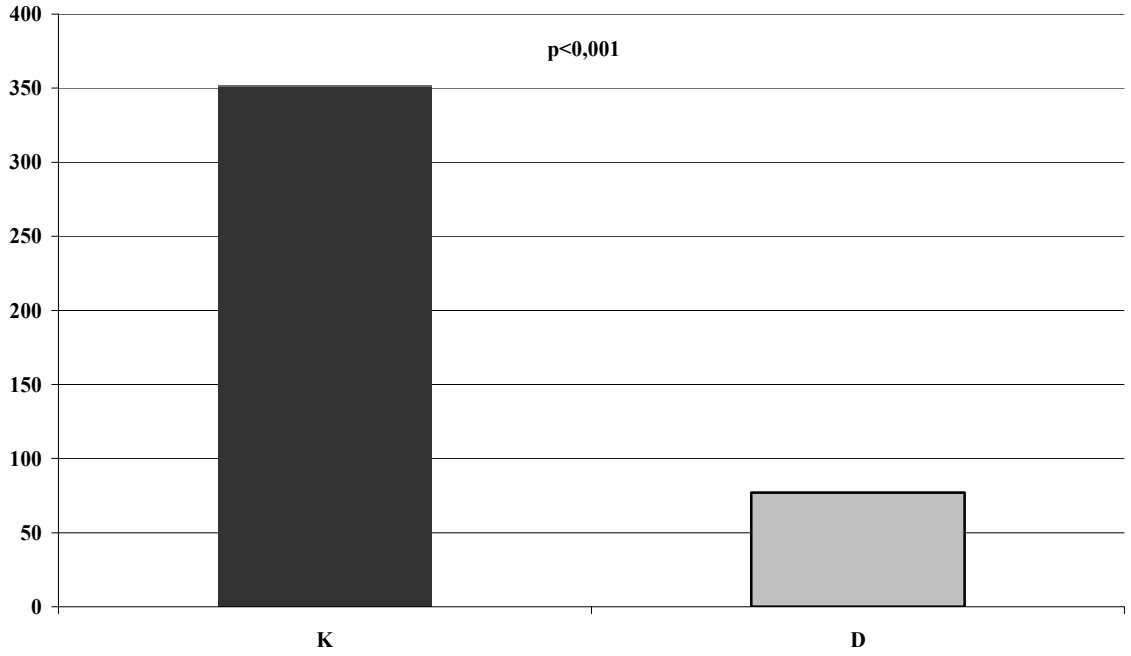

Fig. 2. Blood loss level in the groups «K» and «D»

Analyzing the results, it was noticed that the use of dexmedetomidine made it possible to out the decrease in hemoglobin. In addition, the infusion of the mentioned adjuvant reduced the manifestations of systemic inflammatory response (fever, leukocytosis, left shift of stab cells) in the postoperative period. All this provided a more comfortable condition for patients.

In order to expand these studies in the future, it is planned to compare the results obtained with the results of nefopam, gabapentinides, ketamine using, and the like. It is also interesting to trace the correlation between the intraoperative level of ANI and BIS with laboratory findings and body temperature of patients in the postoperative period.

Table 2

Laboratory findings of patients in observation groups «K» and «D» (M±m)

Stage / Findings	Day1 before surgery		During surgery		After completion of surgery		Day 2 after surgery	
	K	D	K	D	K	D	K	D
Leuckocytes	6,5±0,02	6,2±0,04*	6,3±0,03	6,3±0,04	6,7±0,03	6,2±0,04	11,4±0,04	5,5±0,04*
Stabs	4,3±0,01	5,1±0,05*	4,7±0.01	4,7±0,04	4,7±0,01	5,4±0,03*	10,1±0,01	5,7±0,04*
Fibrinogen	3,1±0,02	3±0,03	3,3±0,02	3,2±0,03*	3,2±0,01	3,4±0,02	4,3±0,01	3±0,04*
INR	1,1±0,01	0,9±0,01*	1,1±0,01	1±0,01*	1±0,01	1±0,01	0,8±0,01	0,9±0,02*
APTT	30±0,28	32±0,25*	29±0,36	29±0,2	30±0,3	30±0,27	25±0,21	31±0,28*
Bleeding by Duke	188±0,4	193±0,54*	182±0,4	122±0,45*	179±0,4	135±0,62*	132±0,4	189±0,81*
Hb	135±0,35	134±0,34	134±0,43	135±0,35	129±0,3	134±0,25*	118±0,31	132±0,37*

N o t e . * – p<0,001 when comparing findings of group «D» with the control

CONCLUSION

The use of dexmedetamidine infusion results in a decrease in the manifestations of systemic inflammatory response in surgical interventions for deflated nasal septum. The administration of dexmedetine provides better blood coagulation during septoplasty. Infusion of dexmedetine leads to a reduction in blood loss, hence the preservation of hemoglobin concentration at the proper level.

Conflict of interest. The author states that there is no conflict of interest.

REFERENCES

1. Dmitrievv DV, Kobelyac'kij YuYu, Kuchin YL [Modern tactics of conducting surgical patients in the perioperative period]. Novosti meditsiny i farmatsii. 2018;7(657). Ukrainian.

2. Zarzar AS, Kim EV, Ataksanov SHE, Mahmudov MA, Zabitova ZM. [Using calculators to calculate the hemodynamic parameters of the left ventricle]. Anesteziologiya i reanimatologiya. 1991;2:2. Russian.

3. Kozlov IA. [A-2-adrenoreceptor agonist dexmedetomidine in the practice of modern sedation]. Obshchaya reanimatologiya. 2013;IX(2):55-65. doi: https://doi.org/10.15360/1813-9779-2013-2-55. Russian.

4. Savvina IA, Kostareva AA, Fedorov AV, Rutkovskij RV, Rasputina DA, Malhozova AM. [The role of general anesthetics in modulation of the systemic inflammation response during perioperative period]. Translational Medicine. Pain, critical care, and anesthesia. 2017;4(5):28-37. Russian.
doi: https://doi.org/10.18705/2311-4495-2017-4-5-28-36.

5. Alazawi W, Pirmadjid N, Lahiri R, Bhattacharya S. [Inflammatory and Immune Responses to Surgery and Their Clinical Impact]. Ann Surg. 2016 Jul;264(1):73-80.
doi: https://doi.org/10.1097/SLA.0000000000001691

6. Bulow NM, Colpo E, Pereira RP, Correa EF, Waczuk EP, Duarte MF, Rocha JB. [Dexmedetomidine decreases the inflammatory response to myocardial surgery under mini-cardiopulmonary bypass]. Send to Braz J Med. Biol. Res. 2016;49(4):e4646. doi: https://doi.org/10.1590/1414-431X20154646. Epub 2016 Feb 23.

7. Snidvongs K, Tingthanathikul W, Aeumjaturapat S, Chusakul S. [Dexmedetomidine improves the quality of the operative field for functional endoscopic sinus surgery: systematic review]. J Laryngol Otol. 2015 Jul;129(Suppl 3):S8-13.
doi: https://doi.org/10.1017/S0022215115001334.
Epub 2015 Jun 5.

8. Emine AK, Oral N, Mehtap H, Vedat Y. [In vitro effect of Dexmedetomidine on platelet aggregation]. Rev. Bras. Anestesiol. 2013;63(5):415-8.
doi: https://doi.org/10.1016/j.bjan.2012.09.006.

9. Kong L, Lu XH. [Effect of dexmedetomidine on perioperative inflammatory response and cellular immune in patients undergoing radical operation of thoracoscopic lung cancer]. Zhonghua Yi Xue Za Zhi. 2018 Sep 25;98(36):2929-2932.
doi: https://doi.org/10.3760/cma.j.issn.0376-2491.2018.36.011. Chinese.

10. Shuji K, Hideo H, Naoko S, Kazuhiko F. [Bidirectional effects of dexmedetomidine on human platelet functions in vitro]. European Journal of Pharmacology. 2015;766:122-8.
doi: https://doi.org/10.1016/j.ejphar.2015.09.049

11. Tan F, Gan X, Deng Y, Li X, Guo N, Hei Z, Zhu Q, Chen ZG, Zhou S. [Intraoperative dexmedetomidine attenuates postoperative systemic inflammatory responsesyndrome in patients who underwent percutaneous nephrolithotomy: a retrospective cohort study]. Ther Clin Risk Manag. 2018 Feb 14;14:287-293. doi: https://doi.org/10.2147/TCRM.S157320

12. Ding DF, Wu LF, Wang P, Jiang YX, Luo YW, Dai ZL, Zhang XP, Li YL. [Target-controlled infusion of propofol and remifentanil combined with dexmedetomidine reduces functional endoscopic sinus surgery bleeding]. Exp Ther Med. 2017 Nov;14(5):4521-26. doi: https://doi.org/10.3892/etm.2017.5075. Epub 2017 Aug 30.

СПИСОК ЛІТЕРАТУРИ

1. Дмітрієв Д.В., Кобеляцький Ю.Ю., Кучин Ю.Л. Сучасна тактика ведення хірургічних пацієнтів у періопераційному періоді. *Новости медицины и фармации.* № 7 (657), 2018.

2. Использование микрокалькуляторов для расчёта гемодинамических параметров левого желудочка / Зарзар А. С. и др. *Анестезиология и реаниматология*. 1991. № 2. С. 2.

3. Козлов И. А. Агонист α-2-адренорецепторов дексмедетомидин в практике современной седации. *Общая реаниматология*. 2013. Т. IX, № 2. С. 55-65. DOI: https://doi.org/10.15360/1813-9779-2013-2-55

4. Роль общих анестетиков в модуляции системного воспалительного ответа в периоперационном периоде / Саввина И. А. и др. *Трансляционная*

медицина. 2017. Т. 5, № 4 С. 28-37.
DOI: https://doi.org/10.18705/2311-4495-2017-4-5-28-36

5. Alazawi W. Pirmadjid N., Lahiri R., Bhattacharya S. Inflammatory and Immune Responses to Surgery and Their Clinical Impact. *Ann Surg.* 2016 Jul. Vol. 264, N 1. P. 73-80.
DOI: https://doi.org/10.1097/SLA.0000000000001691

6. Dexmedetomidine decreases the inflammatory response to myocardial surgery under mini-cardiopulmonary bypass / Bulow N. M. et al. *Send to Braz J Med Biol Res.* 2016. Vol. 49, N 4. P. 646. DOI: https://doi.org/10.1590/1414-431X20154646. Epub 2016 Feb 23.

7. Snidvongs K. Tingthanathikul W, Aeumjaturapat S, Chusakul S. Dexmedetomidine improves the quality of the operative field for functional endoscopic sinus surgery: systematic review. *J Laryngol Otol.* 2015. Jul. (N 129). Suppl. 3. S8-13.
DOI: https://doi.org/10.1017/S0022215115001334

8. Kose Emine Arzu, Nevruz Oral, Honca Mehtap, Yildirim Vedat. In vitro effect of Dexmedetomidine on platelet aggregation. *Rev. Bras. Anestesiol*. 2013. Vol. 63, N 5. DOI: https://doi.org/10.1016/j.bjan.2012.09.006.

9. Kong L., Lu X. H. Effect of dexmedetomidine on perioperative inflammatory response and cellular immune in patients undergoing radical operation of thoracoscopic lung cancer. *Zhonghua Yi Xue Za Zhi.* 2018. Sep 25. (Vol.98, N 36). P. 2929-2932.
DOI: https://doi.org/10.3760/cma.j.issn.0376-2491.2018.36.011.

10. Shuji Kawamoto, Hideo Hirakata, Naoko Sugita, Kazuhiko Fukuda. Bidirectional effects of dexmedetomidine on human platelet functions in vitro. *Eur. J. Pharmacology.* 2015. Vol. 766. P. 122-128.
DOI: https://doi.org/10.1016/j.ejphar.2015.09.049

11. Intraoperative dexmedetomidine attenuates postoperative systemic inflammatory responsesyndrome in patients who underwent percutaneous nephrolithotomy: a retrospective cohort study / Tan F. et al. *Ther Clin Risk Manag.* 2018. 14 Feb. (N 14). P. 287-293. DOI: https://doi.org/10.2147/TCRM.S157320

12. Target-controlled infusion of propofol and remifentanil combined with dexmedetomidine reduces functional endoscopic sinus surgery bleeding / Ding D.F. et al. *Exp Ther Med.* 2017. Nov. (Vol. 14, N 5). P. 4521-4526. DOI: https://doi.org/10.3892/etm.2017.5075. Epub 2017 Aug 30.

The article was received
2019.03.25