Relationships Between the Preoperative HbA1c Levels and the Changes of MAP, HR and Blood Glucose During the Induction With Tracheal Intubation in the Geriatrics

BACKGROUND: As a criteria for screening and diagnosing diabetes mellitus (DM), Glycated hemoglobin (HbA1c) has been increasingly concerned. Geriatrics usually accompany with cardiovascular disease (CVDs) and DM. HbA1c was an independent risk predictor for the outcome of CVDs and/or DM[1]. The severe cardiovascular reaction following tracheal intubation has threatened geriatrics' safety. So we investigated the relationship between the different preoperative HbA1c levels and changes of mean arterial pressure (MAP), heart rate (HR) and blood glucose (Glu) during intubation in geriatrics.

METHODS: 112 geriatrics scheduled for noncardiac surgery were induced with midazolam 0.05mg/kg, propofol 1.5mg/kg, fentanyl 3μg/kg, vecuronium 0.15mg/kg. After 3 mins, tracheal intubation was done though oral way. MAP and HR were recorded before induction (T_0),just before intubation (T_1),at intubation (T_2),1,2,3,5,8 and 10 mins after intubation (T_{3-8}). Blood samples were taken at T_0 to test HbA1c. Glu was measured at T_0,T_1,T_6 and T_8. In view of stratified analysis, cases were divided into 4 groups: group A(HbA1c<5.7%,24 cases), group B (5.7%≤HbA1c≤6.4%,34 cases), group C(6.5% ≤HbA1c<7%,27 cases), group D(7%≤HbA1c≤8%,27 cases). Comparison within groups was done by single factor analysis of variance, comparison among groups by ANCOVA; The relationship of variable was analyzed by the liner correlation analysis(R as correlation coefficient), 0.5<R≤0.8 as significant correlation ,0.8<R≤1 as highly significant correlation .

RESULTS: Compared with group A or B, MAP decreased markedly at T_{1-8} in group C or D(P<0.05). Compared with group C , MAP decreased markedly at T_1,T_{6-8} in group D(P<0.05). HR had no significant difference between group A and B at T_0, while HR of group C and D was more higher than that of group A and B (P<0.05). Compared with T_0, HR decreased markedly at T_1,T_{6-8} in group C and at T1-3,T_{5-8} in group D (P<0.05). Compared with group A or B,HR decreased markedly at T_{1-2},T_{6-8} in group D(P<0.05). Compared with group C,HR decreased markedly at T_{6-8} in group D(P<0.05). The T_Δ (the difference value of MAP between T_0 and T_8 points) of all elder patients was significant correlation with preoperative HbA1c levels(R = 0.637); The H_Δ(the difference valve of HR between T_0 and T_8 points) was significant correlation with preoperative HbA1c levels(R = 0.502). The levels of Glu were gradually increased at T_{0-1},T_6,T_8 respectively in the four groups. There were significant difference among four groups(P<0.05).But after induction, except the Glu levels at T_6 was significantly lower than that at T_0 in group B (P < 0.05), there were no significant difference in each group(P>0.05). Levels of Glu of 112 patients at different times are highly significant correlated with preoperative HbA1c levels (R=0.871, 0.845, 0.847, 0.859, respectively).

CONCLUSION: Changes of MAP, HR and Glu levels during the induction with tracheal intubation were significant correlated with preoperative HbA1c levels. MAP and HR of geriatrics with higher preoperative HbA1c level dropped more obviously after tracheal intubation.

KEY WORDS: Geriatrics; Glycosylated hemoglobin; Tracheal intubation; Mean arterial pressure; Heart rate; Blood glucose

Ref:1.Colayco DC, Niu F, McCombs JS, et al. Glycosylated hemoglobin and cardiovascular outcomes in type 2 diabetes A Nested Case-Control Study. Diabetes Care, 2011;34 (1):77-83.

Figure 1:

Table 1: Patients Charateristics

Groups	Cases	Sex(male/female)	Weight(Kg)	Age (year)	Intubation time (s)
A	24	12/12	60.21±8.17	68.25±4.95	54±3
B	34	25/9	61.56±9.67	66.18±4.81	55±5
C	27	16/11	63.93±10.64	68.26±4.78	54±4
D	27	18/9	63.04±9.59	67.11±3.83	55±3

Table 2: Changes of MAP during anesthesia induction (mmHg , $\bar{x}\pm s$)

	Group A	Group B	Group C	Group D
T_0	98±6	95±8	94±9	98±8
T_1	66±7*	64±9*	53±6*▲●	47±6*▲●★
T_2	89±14 *	90±20	67±11*▲●	66±7*▲●
T_3	103±13*	94±16▲	80±14*▲●	83±12 *▲●
T_4	95±11	91±16	78±13*▲●	79±7*▲●
T_5	83±10 *	81±13*	69±13 *▲●	68±7*▲●
T_6	74±8*	74±10*	63±7*▲●	55±6*▲●★
T_7	70±6*	69±7*	59±7*▲●	51±7*▲●★
T_8	70±6*	66±7*	57±5*▲●	48±6*▲●★

Compared with T_0 ●P < 0.05 ; Compared with A ▲P < 0.05 ; Compared with B ◆P < 0.05 ; Compared with C ★P < 0.05 ;

Table 3: Changes of HR during anesthesia induction (bpm, $\bar{x}\pm s$)

	Group A	Group B	Group C	Group D
T_0	72±8	73±11	80±10▲●	80±10▲●
T_1	64±8*	64±12*	64±10*●	61±10*▲●
T_2	81±12	80±14	78±14	74±7*▲●
T_3	91±11*	85±13*▲	87±13▲	89±9*
T_4	85±12*	78±13▲	87±15	84±9
T_5	79±11	72±11▲	74±11▲	73±6*▲
T_6	70±8	68±9	69±12*	64±6*▲●★
T_7	65±7*	65±8	64±9*	59±6*▲●★
T_8	62±6*	63±8*	61±8*●	57±7*▲●★

Compared with T_0 ●P < 0.05 ; Compared with A ▲P < 0.05 ; Compared with B ◆P < 0.05 ; Compared with C ★P < 0.05 ;

Table 4: Changes of blood glucose during anesthesia induction(mmol/L , $\bar{x}\pm s$)

	Group A	Group B	Group C	Group D
T_0	5.10±0.51	6.06±0.62▲	6.89±0.91▲●	8.73±1.38▲●★
T_1	4.82±0.62	5.79±0.64▲	6.45±0.88▲●	8.34±1.30▲●★
T_2	4.86±0.54	5.70±0.72*▲	6.62±0.94▲●	8.40±1.29▲●★
T_3	5.14±0.57	5.92±0.65▲	7.03±0.93▲●	8.87±1.32▲●★

Compared with T_0 ●P < 0.05 ; Compared with A ▲P < 0.05 ; Compared with B ◆P < 0.05 ; Compared with C ★P < 0.05 ;