اثرات چافی در بیهوشی جراحی طولانی‌مدت‌نیان:
استفاده از گوسفندان دندان‌های ایرانی بعنوان یک روش نوین
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خلاصه
از زمان معرفی بارپیتون‌های بهار مبتلا به بیهوشی انسانی و دام‌پزشکی در سال ۱۳۶۳، بارپیتون‌های تیپ ۱ به بهبود مبتلا به بیهوشی دام‌پزشکی به‌عنوان یکی از اولین مواردی است که درمان‌های کاملاً برای بهبود بیهوشی در ایجاد گرفته شده است. در این پژوهش، برای بررسی اثرات گونه‌های مختلف مورد استفاده در بیهوشی، یک گروه سه‌ماهه از گوسفندان به درمان گوسفندان طولانی‌مدت‌نیان در بیهوشی عهده‌برداری شدند. نتایج نشان داد که بهبود بیهوشی به توده‌های طولانی‌مدت‌نیان توسط گوسفندان به‌بعد بهبودی بیهوشی در این گروه کاملاً مانند در بیهوشی طولانی‌مدت‌نیان بین‌پستانی در فرآیند بهبودی بیهوشی تا زمان‌های مختلفی بسیار بهتر بود. بنابراین، بیهوشی در بیهوشی طولانی‌مدت‌نیان ممکن است برای این اینکه استفاده گوسفندان به بهبود بیهوشی انسانی و دام‌پزشکی به‌عنوان یک روش نوین باشد.
پیشینگ کننده آزمایشگاهی برای بررسی اثرات جاتی درسپروس، طلایی و نیوپراتی با استفاده از حساسیت معیارهای مدیریت زیست‌محیطی، برای این منابع استفاده گردید. علت اصلی این امر اهمیت سطح نسبی آنها در مرحله دوم قطع شده است. سپس بررسی حالت‌های مرحله اول با مصوبه انجام گرفت. 

در صورتی که در مرحله دوم قطع شده‌اند، بخش زیست‌محیطی در مرحله اول بسیار بیشتری را داشته‌اند. این موضوع به‌طور مستقیم به‌وجود آمدن نمایندگان مرحله اول از دست داده می‌شود.

از نتایج حاصل از توانایی توان نقل‌چهاری را در حال بررسی داشتیم که مسئله‌ها به‌طور کلی قابل حل و پیش‌بینی شده است. سرانجام نتایج به‌دست آمده در این تحقيقات باعث این مطلب است که گوسفندهای ایرانی کیفی را به‌طور کلی به‌طور صحیح باشند.
be attributed to fat removal in amputated tail sheep.

Average recovery time in normal animals was 358.10±65.77 minutes. But, recovery time in tail amputated animal significantly decreased from 358.10±65.77 to 204.50±88.49 minutes. The differences could be due to higher metabolism and excretion rate in amputated tail sheep; since, there is higher plasma concentration of thiopental in this group of sheep, due to lack of high fat tissue, consequently, the drug gets metabolized and excreted faster and recovery period becomes shorter.

Results obtained in this study could firmly prove the important role of obesity in human and veterinary anesthesia. These data also suggest that anesthesiologist should more seriously consider the obesity at the time of practice. All this experiment proves that sheep is a good model in this kind of research.
SUMMARY:
Anesthesiologist in human medicine noticed that patients with higher degree of fat deposit need more anesthetics and also recovery period in these patients is longer than normal patients. These indicate the important role of fat deposit that may play in prolonged thiopental anesthesia. Unfortunately, due to lack of clinical model, to the best of our knowledge, no experimental studies has been yet designed to prove the experience that anesthesiologist have obtained during clinical practice. Consequently, we thought that the Iranian fat tailed type sheep could be the best model to be used, since this kind of sheep could deposit a large amount of fat up to 10% of its body weight or more, depending on strain and age, at its tail area.

Prolonged surgical anesthesia was induced in Iranian fat tailed type sheep with initial dose of 26.51±5.82 mg/kg of body weight, and maintained successfully by repeatedly injecting the maintenance dose of 22.97±5.26 mg/kg, 20.31±5.67 mg/kg and 14.10±5.31 mg/kg of thiopental for 1st., 2nd. and 3rd. hour of anesthesia respectively in this study.

Maintenance dose in tail amputated animal is decreased respectively from normal sheep 22.97±5.26 to 21.99±6.34, 20.31±5.67 to 14.75±4.61 and 14.10±5.31 to 8.56±3.20 mg/kg during 1st., 2nd. and 3rd. hour of anesthesia. The differences between maintenance dose in normal and amputated tail sheep in 2nd. and 3rd hour of anesthesia could

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Table 2. Shows the beginning of different reflexes after 3 hrs. of thiopental anesthesia.

Table 3. Shows the beginning of voluntary movements and recovery period after 3 hrs. of thiopental anesthesia.

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REFERENCES


time of induction anesthesia. Consequently, the varia-
tilities in initial and maintenance dose in lst hour of an-
esthesia could be attributed to physiological state of
each individual at time of anesthesia.

The decrease in maintenance dose in normal sheep
(stage I) indicates that thiopental probably gets to
equilibrium state in fat tissue after one hour of repea-
ted injection. Thereafter, it starts decreasing at 2nd
hour onward significantly. However, the differences be-
tween maintenance dose in normal and amputated tail sheep
in 2nd and 3rd hour of anesthesia could be attributed
to fat removal in amputated tail sheep.

The differences in recovery time in normal and ampu-
tated tail sheep could be due to higher metabolism and excre-
tion rate in amputated tail sheep, since there is higher
plasma concentration of thiopental in amputated tail sheep,
due to lack of high fat tissue, consequently, the drug ge-
ts metabolized and excreted faster and recovery period be-
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The results obtained in this study could firmly prove
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model in this kind of research.

Legends

Table 1. Shows percent of fat removal, initial and main-
tenance dose and recovery period in 3 hrs. of thiopental
anesthesia.
not show any undesirable sign. But, recovery time significantly decreased from 358.10 ± 65.77 to 204. 50±88 ±49 minutes (Table 1). The decrease was also reflected in other parameters including down time, standing and full leg coordination which were important criteria during recovery period (Table 2,3). In the recovery period of animals in stage III, recovery signs frequently were not observable or did not appear in the right order as appeared in normal animals in stage I (Table 2,3).

In general, accumulative effect of thiopental was observed. Heart rate and rhythm and respiratory pattern in tail amputated sheep (stage III) were also normal as previously reported.

Discussion

Thiopental induced surgical anesthesia was successfully maintained for three hours in normal and tail amputated sheep in this study. Accumulative effect of thiopental was also observed in animals in both stage I and II. Sixty percent of tail amputated sheep (animal in stage II) showed that they need less initial dose than before tail amputation, while other forty percent need slightly more initial dose of anesthetic (table 1). A noticeable and significant decrease was observed concerning the maintenance dose. The decrease specially was much more statistically significant from 2nd. hour of anesthesia onward (0.02 P 0.05).

The variable results that observed in initial and maintenance dose (1st. hour of anesthesia) could be easily explained; since, thiopental does not have time to distribute in fat tissue in both group of animals at the
nance of anesthesia as already described in stage I. recovery period and signs were also checked in these animals as described before.

The results of this experiment was statistically analysed using student "t" test.

Results

Prolonged surgical anesthesia was induced in iranian fat tailed type sheep with initial dose of 26.51±5.82 mg/Kg of body weight, and maintained successfully by repeatedly injecting the maintenance dose of 22.97 ± 5.26 mg/Kg, 20.31 ± 5.67 mg/Kg and 14.10 ± 5.31 mg/Kg of thiopental for 1st., 2nd. and 3rd. hour of anesthesia respectively in this study (Table 1). Induction of anesthesia in tail amputated animals was also successfully induced with initial dose of 22.94 ± 5.74 mg/Kg thiopental sodium. Maintenance dose in this group of animal is decreased respectively from normal sheep 22.97 ± 5.26 to 21.99±6.34, 20.31 ± 5.67 to 14.75±4.61 and 14.10±5.31 to 8.56±3.20 mg/Kg during 1st., 2nd. and 3rd. hour of anesthesia (Table 1).

All animals in stage I showed no complication or undesirable sign during recovery period. Sheep obtained their eyelids, pedal, jaw movement, cough reflexes and passed through standing and walking state up to full leg coordination smoothly. Average recovery time in these animals was 358.10±65.77 minutes. During recovery period, the animal in stage III (amputated tail sheep) also did
piratory patterns were monitored. After 3 hours of anesthesia thioental sodium injection was discontinued and animal kept under close observation during the recovery period, up to the point that animal could climb up the stairs (full leg coordination).

Stage II (Fat removal or tail amputation).

All necessary clinical precautions, including cardiovascular and respiratory examinations, were taken before induction of anesthesia for all sheep. The procedure of induction and maintenance of anesthesia were the same as previously described in stage I. However, sheep were positioned on left lateral recumbancy on table. The tail and its base was clipped and shaved carefully and prepared for an aseptic operation. After drapping, a curved incision was made at the level of first and second coccygeal junction dorsally and venterally through the skin by scalpel. Then, the subcutaneous fascia and fat layer was dissected blindly by a pair of scissors. The fibrous attachment of first and second coccygeal junction was separated by scalpel. Effort was made to remove all deposited fat at tail area. After fat removal the subcutaneous fascia was opposed together in a simple continuous suturing pattern, and skin was sutured in a simple horizontal pattern. Almost all sheep had post surgical care for 2 weeks and no complication was observed.

Stage III (Thiopental anesthesia in tail amputated animal).

The same procedure was used for induction and mainte-
Blood samples were taken from free-flowing jugular vein of each sheep for analytical determination before induction of anesthesia. The following analytical methods were used: serum glutamate-oxalacetate transaminase (SGOT) and serum glutamate pyruvate transaminase (SGPT) activities were determined spectrophotometrically (510 m) in order to see the liver function. Blood urea nitrogen (B.U.N) was determined in order to be sure of kidney function as a routine. The experiments in this study were carried out in 3 different stages; Stage I (Thiopental anesthesia), Stage II (Fat removal or tail amputation) and Stage III (Thiopental anesthesia in tail amputated animal).

Stage I (thiopental anesthesia).

For induction of anesthesia, five percent thiopental sodium solution was freshly prepared and injected via jugular vein. The nearly half dose (obtained from our previous study) of thiopental injected during first minute and then continued to observe the desirable effect. Then after, trachea was intubated. The head of animal was kept in lower level than the pharynx to facilitate the gravity flow of saliva out of oral cavity. A plastic cannula was inserted into jugular vein to facilitate the anesthetic injection. However, in order to maintain the animal in deep surgical anesthesia, the absence of eyelids, palpebral and pedal reflexes which are indicative of surgical anesthesia, were checked all the way through for 3 hours. Meanwhile, heart rate and rhythm, and res-
sonal lab. (1,2,3,4,5). From pharmacokinetic point of view also has been shown that plasma level of thiopental sodium remains, when repeated doses of thiopental used, near that in fat tissue. On the other hand anesthesiologist in human medicine noticed that patients with higher degree of fat deposit need more anesthetics and also recovery period in these patients is longer than normal patients. These indicate the important role of fat deposit that may play in prolonged thiopental anesthesia. Unfortunately, due to lack of clinical model, to the best of our knowledge, no experimental studies have been yet designed to prove the experience that anesthesiologist have obtained during clinical practice. Consequently, following experiments were undertaken in order to show the significant effect of obesity on prolonged thiopental anesthesia.

MATERIALS AND METHODS

Due to the lack of experimental model, we thought that the Iranian fat tailed type sheep could be the best model to be used, since this kind of sheep could deposit a large amount of fat up to 10% of its body weight or more, depending on strain and age, at its tail area.

Consequently, following self control experimental design has been set. Ten apparently healthy iranian fat-tailed type sheep, aged 12-14 months and weighing 24 to 36 kilograms from both sexes were kept in ranch grazing condition and were supplemented with dry hay and water ad libitum.
Effects of obesity on prolonged thiopental surgical anesthesia:

Iranian fat tailed type sheep used as a new model.

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Since the introduction of ultra-short acting barbiturates to human and veterinary anesthesiology in 1938, thiopental is extensively employed advantageously for numerous conditions such as gynaecologic examination and setting fracture and so on. Thiopental is also used as induction agent before administration of inhalant anesthetics, including halothane and methoxyflurane. It is true that thiopental is used for its brief action, but it may be used for prolonged anesthesia by repeatedly injecting and/or infusion doses as needed in places in which anesthesiologist are short of equipments. During world war II thiopental came into wide use as a routine anesthetics in human in front-line hospitals where equipment was limited. As a consequence of wide spread use of thiopental all over the world, a great deal of research has been carried out concerning the effects of thiopental sodium on heart, respiratory system, acid-base balance, hematological pattern and biochemical values in our per-

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