



Review Article

## Analgesia and anesthesia during IUD insertion: local anesthetics

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### Abstract

**Background:** Intrauterine Device (IUD) is an effective and long term method of contraception that can be used without continued effort by the user to prevent pregnancy perfectly. Pain during IUD insertion is one of the obstacles to properly using the device. Thus, using different methods of analgesia and anesthesia to alleviate this pain has been studied by many researchers. This review article also aimed to assess different methods of analgesia and anesthesia to achieve a comprehensive result regarding the issue. The present study was a review of more than 50 articles on the methods of analgesia during IUD insertion. The articles are available in PubMed, Elsevier, and Google scholar databases. Unfortunately, no acceptable and ideal way has been found for reducing pain during IUD insertion. Although paracervical block showed satisfactory results, more studies and clinical trials are required to be conducted in this area.

**Keywords:** Analgesia, Anesthesia, Intrauterine Device

### Introduction:

Intrauterine Device (IUD) is one of the most effective, long-term, and reversible methods of contraception which is widely used in the world (1). According to the global statistics, about 100 million women of reproductive age in the world use IUD and the rate of IUD use is varied from 6% in developing



countries to 0.5% in African countries (2). Considering the developed countries, the rate of IUD use has been reported as 2%, 5%, 6%, 6%, 18%, and 21% in the U.S., UK, Switzerland, Germany, Finland, and France, respectively (3).

Annually, about 40 million women around the world experience IUD insertion (4). In Iran also, 16% of women use IUD (5). The results of the studies on the cost-effectiveness of contraceptive methods showed IUD as the best available device with a low failure rate (6, 7).

In comparison to other contraceptive methods, long-term ones, such as IUD, have shown more effectiveness and lower discontinuation rate (8, 9). Besides, some evidences have confirmed IUD to be in the first line of the contraceptive methods (8, 10, 11).

In spite of the advantages of IUD, including long-term effectiveness, reversibility, no need for user intervention, etc, the device does not have enough popularity among the women of reproductive age with the fear of insertion pain being one of the main reasons. Several qualitative studies have also confirmed pain as a major obstacle to IUD use (16-12).

IUD insertion causes pain throughout the following reasons : Using Tenaculum to catch the cervix and straighten the uterus; doing intrauterine procedures, such as measuring the length of the uterus, IUD insertion, and discharging the tube; and placement of IUD in the uterus (4).

It seems that if IUD insertion was painless, more people would be willing to choose this method as a means of contraception. Nowadays, pain during IUD insertion is reduced through two methods: oral analgesia and local anesthesia (17).

The present study aims to investigate the articles on reducing pain during IUD insertion in order to evaluate the employed techniques and introduce a new pain reduction method. Thus, the researchers examined the results of extensive studies in order to achieve a comprehensive result regarding which method (oral or local anesthesia or a combination of both methods) could lead to better pain relief during IUD insertion. In fact, the study aims to answer the following questions: How much pain is felt during IUD insertion? Are certain conditions conducive to reducing or increasing the patients' pain? Which method is more effective for pain relief during the procedure? In order to achieve a reasonable response that could be beneficial for the patients, it is necessary to properly examine the recent studies and come to a logical conclusion of their findings. Considering what was mentioned above, perception, comprehension, and application of the most effective methods of analgesia are a necessity in this area. Therefore, this study seeks to examine and answer these questions.



**Methods:**

The current study is a review of more than 50 articles on the methods of analgesia during IUD insertion. The articles are available in PubMed, Elsevier, and Google scholar databases. Most of the articles examined analgesia as well as the techniques to achieve this purpose.

**Discussion:**

**Setting the amount of pain during IUD insertion:**

In this part, the references and studies are examined in order to answer these questions:

Is IUD insertion a painful process or the pain is just aroused from the fear? How much pain is felt during IUD insertion? The severity of the pain that women feel during IUD insertion is different in various studies with moderate to severe pain being reported most often. In all the papers evaluated in this study, the pain varied depending on the women's age and circumstances. It is notable that in most of these studies, the visual analog scale or qualitative measurements were used in order to measure the pain. In some of the papers, the pain was measured during different procedures (insertion of speculum, tenaculum, and hysterometer, and finally entering the IUD). Given that in the majority of these studies interventions were performed to reduce pain, in this part only the studies which estimated the pain without intervention were focused. The findings of those articles are summarized in Table 1.

Table 1. Mean levels of pain during IUD insertion

study	Sample number	Mean pain score during IUD insertion	Measuring Scale
Seamark et al (1993) (20)	23	painful speculum insertion: Score=4 painful Tenaculum insertion: Score=8  painful IUD insertion: Score=5  all procedure painful Score=3	qualitative
Ulto et al. (1997) (21)	102	IUD insertion: Score=6	10cm visual analogue scale
Alizadeh et al. (2012) (22)	96	IUD insertion: Score=3.5	10cm visual analogue scale



Newton et al. conducted a study entitled "The effects of psychological preparation on pain during IUD insertion" in 1997. Before IUD insertion in that study, 31 women were trained regarding IUD insertion pain, abdominal cramps, and the way to deal with them. Also, 28 women were entered into the study with no training. The results were astonishing; the subjects who were mentally prepared felt less pain. It should be mentioned that the severity of pain was measured quantitatively in that study. The study results are presented in Table 2 (18).

Table 2. The results of the study by Newton et al.

group	painless	Low pain	moderate pain	severe pain
cases	18	6	2	0
controls	9	6	7	2

In that study, most of the participants in the control group reported moderate to no pain. In addition, very little pain was reported in the study conducted by Hubacher (pain of less than 1, between 1 and 2, 5, and seven and above in 48%, 15%, 11%, and 4%, respectively) (19).

In a Brazilian study, 9% of IUD users had severe pain during the insertion; however, the measuring scale was not reliable in this study (23). In another study, the pain during insertion was examined in 23 participants. The process was considered as painful, uncomfortable, and painless by 4, 16, and 3 subjects, respectively (20).

#### What is effective in reducing or increasing the pain?

In 1986, Chi et al. in a case-control study mentioned the factors increasing the pain during IUD insertion in developing countries to be 1- high education level (7 years or more), 2 - low parity (1 or 2 parity), 3- long distance between the last pregnancy and insertion of IUD (over 13 months), and 4- lack of breastfeeding during IUD insertion. It should be noted that the pain in this study was measured qualitatively (24). In another study by Murty et al., it was confirmed that fear and stress caused the individuals to experience more severe pain during IUD insertion (25).

In 2008, Brooke Meier et al. compared the actual pain with the individuals' expectations before IUD insertion. According to the results, the actual pain was less than expected in 33%, consistent with the expectations in 45%, and higher than expected in 29% of the patients (26).

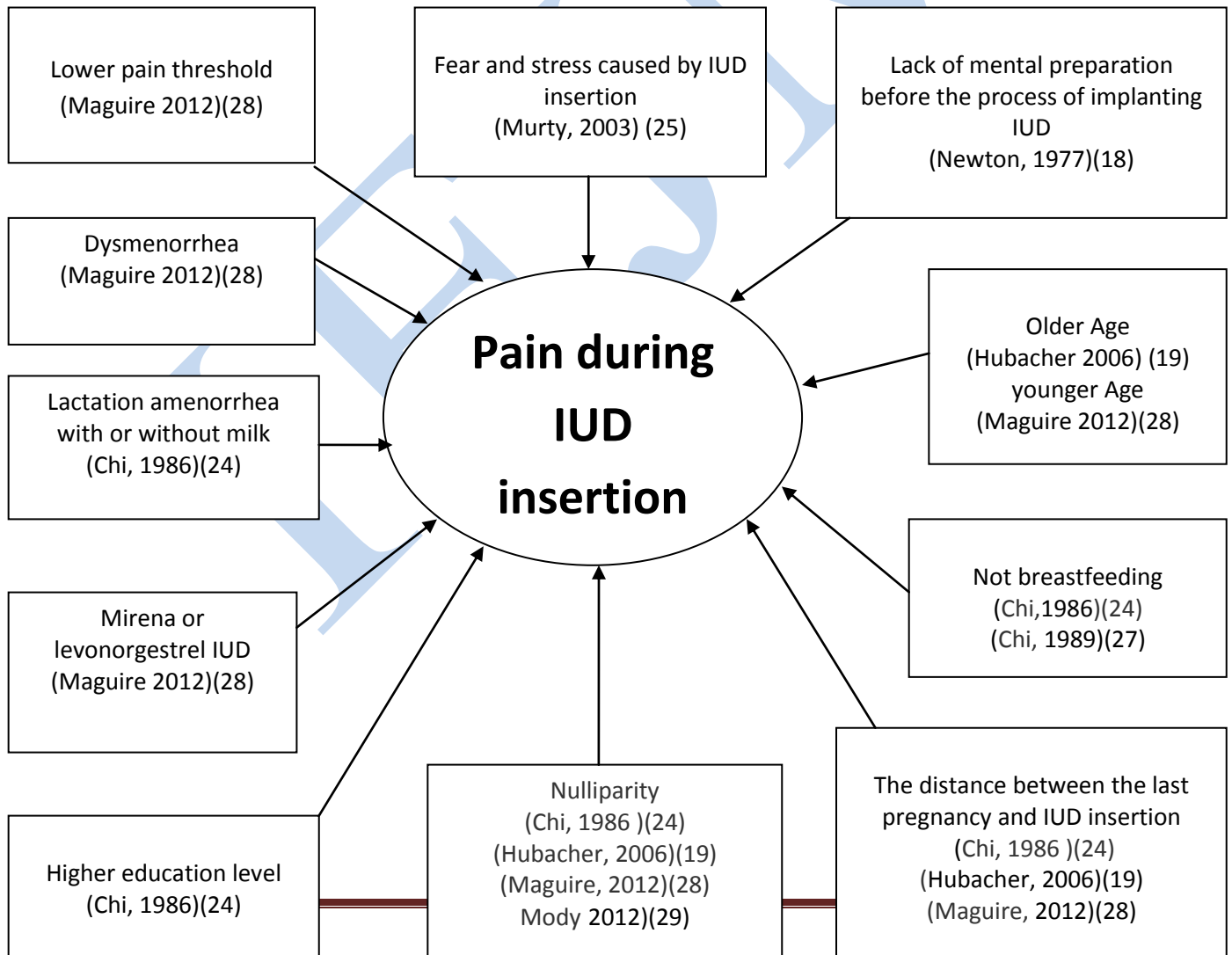
Chi et al. (1989) assessed the effect of breastfeeding on IUD insertion pain in 6493 women. They found that lactiferous women and those who suffered from lactation amenorrhea had less pain and lower need for cervix dilation compared to the others. After all, the researchers concluded that this phenomenon was related to the increase in the secretion of endorphins (27).

Furthermore, in the study by Hubacher, old age, nulliparity, lack of lactation, and long distance between the last pregnancy and IUD insertion resulted in increased insertion pain (19). In 2012, Maguire et al. proposed a model for pain during IUD insertion which was based on the following factors: the distance between IUD insertion and the last pregnancy, parity, presence or absence of dysmenorrhea, type of IUD (levonorgestrel is accompanied by more pain), and the individuals' threshold of pain.

Using another model, they also predicted the amount of pain during insertion of hysteroscope. In this model, the previous birth interval, parity, and the threshold of pain were the determining factors. The researchers also found that hysteroscope and IUD insertion was more painful in comparison to other procedures (28).

The factors affecting the severity of pain during IUD insertion are briefly presented in Figure 1.

Fig. 1: The factors affecting the severity of pain during IUD insertion.



**Analgesia and anesthesia during IUD insertion**

**1- Oral analgesia methods:**

The use of NSAIDs is a common technique for reducing pain during IUD insertion. Ibuprofen, mefenamic acid, and naproxen are also among the painkillers used during IUD insertion.

Among the studies that were examined in the current study, 4 reduced the pain of IUD insertion with the help of NSAIDs. In these studies, the used drugs varied from ibuprofen to naproxen. The dose and duration of the treatment was also different until IUD insertion. All these studies are listed in Table 4. In most of the studies, the pain was measured through a linear 0-10cm diagram. The pain intensity and the time of measuring the pain in these studies were different.

Table 4. Evaluation of the studies which used oral methods for reducing the pain

Study (year of publication)	Drugs	Samples	Time of administration	Scale	Time of pain evaluation	p-value	Notes
Hubacher (2006)(19)	ibuprofen 400mg Vs. placebo	Control= 1008 Case= 1011	45min before intervention	10cm diagram	Immediately after insertion	p >0.05	Average pain in placebo group = 2 Average pain in case = 8/1
Chor (2012)(33)	ibuprofen 800mg Vs. placebo	Control=37 Case=44	45min before intervention	10scores diagram	Immediately after insertion	p >0.05	The type of IUD and parity did not affect the pain
Karabayirli (2012)(34)	tramadol 50mg Vs naproxen 550mg Vs. placebo	T=35 N=34 P=34	1hour before intervention	10cm diagram	Immediately after insertion	T Vs. N (p = 0.003) N Vs P (p = 0.001)	the type of IUD was identical in all three groups and the average of pain was: T = 2.31 N = 2.94 P = 4.88

One study conducted in 1974 showed that the women who had received Dalkon Shield naproxen before IUD insertion reported less pain in comparison to those who had received the placebo (30).

In 1979, Buttram examined the effect of naproxen and placebo on dysmenorrhea and uterine pain before and after the insertion of IUD. In that study, the participants were divided into a control (n=16)



and a case group (n=17). The control group received the placebo, while the cases were given naproxen 550mg followed by naproxen 275mg every 6 hours. The study findings revealed naproxen to be effective in reducing the pain of IUD insertion (P=0.02) (31).

In a double-blind study by Jensen et al. in 1998, 55 women (three were nulliparous) were treated by ibuprofen and placebo for up to 4 hours before IUD insertion. Then, the pain was checked for 4 to 7 hours after the insertion and the next morning. However, no significant difference was found between the cases and the controls regarding their pain severity (32).

## 2- local analgesic methods

Using local anesthetics for pain relief in women during IUD insertion has many applications. Injection of lidocaine and paracervical anesthesia gel is among the methods that scholars have benefited from for analgesia and anesthesia. In this article, 9 studies on local anesthetic in the process of IUD insertion were investigated. These studies have been summarized in Table 5. These studies were different regarding the application of the anesthetic, use or non-use of the placebo, the interval between anesthesia induction and IUD insertion, and the time of pain measurement.

In a review demonstrated that women do not prefer IUD as a contraceptive method, because of fear of pain during IUD insertion. Then, several studies explored drugs that reduce uterus cramping, soften, open and numb the cervix (35).

Amyot-Legault et al. in 1981 injected paracervical lidocaine to 842 women (74% were nullipara) before implanting IUD. They concluded that 17% of the nulliparous group had a little pain and only 2 patients reported severe pain. The vasovagal shock was reduced, as well (36).

Kurz et al. used paracervical block by using jet devices in order to reduce pain and obtained satisfactory results. However, because of the expensiveness of the device and the difficulty of the procedure, this method did not receive much attention (37).

In another study in 1997, Oloto et al. divided 102 women into three groups of 1- no intervention, 2- injection of lidocaine gel 2% into the cervical canal, and 3- the placebo injection. The results indicated that the lidocaine injection group felt significantly less pain compared to the other two groups (p<0.025) (21).

Also, Alizadeh et al. conducted a similar study on 96 women in Tabriz. However, the average pain was 3.5 in the 3 groups and lidocaine had no effects on pain (22).

Table 5: Use of local anesthesia for reducing pain during IUD insertion

Study (year of publication)	Drugs	Samples	Time of administration	Scale	Time of pain evaluation	p-value	Notes
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<b>Nichols (2012) (38)</b>	Lidocaine (injected gel)2% (3ml) Vs. Placebo gel	200	3min before insertion	10 mm diagram	Immediately after insertion	p>0.05	The type of IUD and nulliparity did not affect the pain
<b>Maguire (2012) (28)</b>	Lidocaine (Intracervical)2% (1ml) Vs. Placebo	Control=99 Case=100	Just before the insertion	100mm diagram	5min after insertion of Speculum, tenaculum and IUD	p>0.05	The pain was sever while using the hystrometer and inserting the IUD Average controls pain=51.6 Average cases pain=55.5
<b>Mody (2012) (29)</b>	Lidocaine (paracervical block )1% Vs. No intervention	Control=24 Cases=46	3min before insertion	100mm diagram	Immediately after insertion	p>0.05	in this method for implanting Tenaculum first 2ml was injected at 12:00 and then another 10ml was injected average pain in controls=62
<b>Nelson (2012) (39)</b>	Lidocaine 2% (Intra uterus) 1.2ml Vs. Placebo gel	Control=20 Case=20	3min before insertion	0-9 scores	Immediately after insertion	p>0.05	women were 11 given NSAID about 15 minutes to 2-hours before; however, it showed had no effects (P <0.76 pain mean in the patients getting lidocaine = 3.89 pain mean in the cases =3.25

**Discussion:**

IUD is a safe and temporary method of contraception. In case the individual is selected properly, sufficient and proper consultation is provided before insertion, and insertion is performed correctly, it is a safe method which, unlike pills, does not need daily attention and has long-term and reversible effects (40, 41).

As mentioned before, the fear of IUD insertion pain reduces the plausibility of this approach. In the investigated studies in the present research, the subjects' pain varied from moderate to severe. In most of the studies, the pain was in the moderate range and the two boundaries of severe and mild were less reported.





In general, many factors including parity, lactation, distance from the last pregnancy, age, education, and psychological factors, are involved in pain (19, 24, 42 - 43). The place of insertion of copper IUD is 4 mm while the location of levonorgestrel IUD is from 4.65- 4.85 mm, which shows that the insertion of Mirena or the levonorgestrel IUD is harder and more painful (44, 45). In addition, the results of the studies confirmed that IUD, tenaculum, and hysterometer insertion could also be painful (28, 33).

Two methods for analgesia during IUD insertion process have been used so far.

### **1. oral methods**

Several studies have been conducted on the effect of NSAIDs on pain during IUD insertion. In one study, taking naproxen before the insertion of an IUD was effective in reducing pain (30). In most studies, ibuprofen (400-800mg) was administered 45 minutes before IUD insertion. Most of the studies had a case-control design and the second group was given the placebo. However, none of these studies showed ibuprofen to have positive effects on pain. Naproxen sodium (550mg) was evaluated in other three studies and was revealed to decrease pain both during and after the IUD insertion (30, 31, 34). In a study in Turkey, tramadol (50mg) resulted in higher pain reduction compared to naproxen. Nonetheless, considering the side effects of tramadol, the use of naproxen is more rational (34).

Although NSAIDs were not successful in reducing the pain during IUD insertion, they were very effective in reducing pain and cramps in the uterus after IUD insertion. Using NSAIDs for reducing the insertion pain causes pain relief all over the body. Therefore, it raises the concern that in case of rupture, it may reduce the main symptoms of pain as an alarm (19, 30, 31).

### **2. local anesthetics**

These methods have been popular since the '80s and '90s. In these methods, the concentration of lidocaine (1-2%), the injected amount (1.2-10ml), and the injection site are very different. Even the injection interval varies from 0 to 3 minutes. The injections are paracervical block, intrauterine, and intracervical. In recent studies, using intracervical anesthetic had no effects on the pain during IUD insertion (28, 22, 29, 38 - 39). However, these methods were considered very effective in earlier studies and caused reduction in the pain and incidence of vasovagal shock (21, 35, 36, 37).

Many physicians believe that paracervical block reduces pain during IUD insertion (49). The injection of lidocaine gel has also been studied at various gynecological procedures (50, 51).

Para cervical block is an injection of anesthesia into the vagina and cervix annexation point at 4 and 8 o'clock positions. Para cervical block is performed in several ways which vary regarding the injection site, the injection depth, and the type and amount of anesthetic (29).



Cruise in 1983 used a device named jet injection to create a paracervical block for reducing pain during IUD insertion. The jet device injects a 2-3% anesthetic solution into the paracervical submucosal with high-pressure carbon dioxide. The results showed that the paracervical block reduced the pain during IUD insertion (37). In the same line, Amyot-Legault confirmed the effectiveness of paracervical block in reduction of pain in nulliparous women (36).

Moody et al. in 2012 used paracervical anesthesia to relieve pain. The results showed that pain during tenaculum insertion reduced significantly compared to the control group ( $p=0.008$ ).

It seems that paracervical block, in contrast to lidocaine gel injection into the cervical canal, can relieve the pain of IUD insertion. Considering the fact that old and new studies agree on analgesia in the paracervical block, the authors of the current study tried to design a disposable set to build paracervical block on the points 3 and 9. In addition to being useful for further pain relief during IUD insertion, the device can be used in other cases of paracervical block. This technique is easy, cost effective, and affordable and the maximum time required for this procedure is 60 to 90 seconds. Not only is working with this device easy, but also the paracervical block does not reduce blood pressure and decreases the vasovagal shock as a result of cervical pain. It seems that such a simple device with easy operation is one of the requirements in obstetrics and gynecology.

#### **The structure of local anesthetics:**

The device consists of two parts; a syringe and a modified speculum. The syringe includes a separate section for fixing the needle and a tube for keeping the cartridge containing the anesthetic. Also, the end piston is used for aspiration. In this syringe, two separate parts are designed for the two hands' fingers in order to be more dominant during the procedure.

Another advantage of the syringe is that the needle can be replaced many times. In fact, the syringe can be sterilized in an autoclave, which is financially cost effective.

It should be mentioned that the syringe needle is strong enough to ensure that it will not break during the injection. Moreover, the length of the needle is appropriate for cervical injection and passing the vaginal canal. Due to the proper piston, the possibility of aspiration during the injection is easily provided. Therefore, it is quite desirable for injection of the anesthetic. The needle is sterile and disposable with a length of 15 cm. Besides, its 1-1.5cm long end is admissible to the tissue. At the end of the speculum, a part is designed which is fixed on the cervix and has the ability to change the size. Thus, the examiner is able to coordinate the size with the cervix to reduce or increase the size until it is completely fixed on the cervix. This part in a shape of two wings goes out of the middle of the upper surface of the speculum and is fixed on the anterior and posterior walls of the cervix. In this way, the by lateral of the cervix is open. Two parts at the 3 and 9 o'clock of the speculum were considered for insertion of the disposable needles. In this method, after setting the device on the cervix, two needles



are entered exactly into 3 and 9 o'clock injection sites and, consequently, any potential error in finding the proper location of injection is decreased.

**Procedure with local anesthetic:**

In the proposed method, the target device is used after speculum insertion, so that the examiner gains complete control by placing his/her fingers on the designed locations. Then, the device is inserted and put on the cervix. With the help of the machine end screw, it is matched and fixed perfectly with the size of the cervix. Afterwards, the two needles are removed from the designed sites and the examiner with the help of piston and aspiration is ensured about the correct location. Finally, the injection is performed.

**The benefits of local anesthetics:**

By implementation of this new model, the errors that sometimes play with the people's lives can be prevented:

- Improper administration of medication to the patients
- Incorrect use of medical devices
- IUD insertion pain
- Vasovagal shock followed by cervical pain
- Using paracervical block in other gynecological procedures

According to what was mentioned above, more studies with acceptable sample sizes or even large trials are needed to be conducted in order to confirm this assumption. It should be borne in mind that these studies in addition to showing the effectiveness of such instructional policies can help to identify, fund for development of, and provide easier access to the most popular techniques among the target population.

**Conclusion**

It seems that paracervical block with the help of a safe tool and method is effective in reducing pain during IUD insertion. Thus, one of the main obstacles to using this effective, safe, and reversible technique is eliminated.

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