

The effect of information level and coping style on pain and anxiety in needle liver biopsy

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Biopsy of the liver is an important diagnostic procedure. The procedure is invasive and may be painful for patients. Sedative drugs are not used because the associated drop in blood pressure mimics hemorrhage, a major complication of the procedure. Cognitive and behavioural techniques have been used to decrease stress in patients undergoing other medical procedures. In the present study, it is postulated that providing procedural and sensory information may reduce patient anxiety levels. Patient coping styles were evaluated and anxiety and pain levels were assessed by using a visual analogue scale. Subjects were randomly assigned to one of two groups. The control group received basic information about the procedure. The experimental group received the same basic information followed by more detailed educational information. Subjects also filled out the Krantz Health Opinion Survey, a short questionnaire used to classify coping styles as either information-seeking or information-avoiding. Seventy-five subjects (38 control and 37 experimental) with similar demographics were included in the present study. No significant differences were found in anxiety levels or pain levels 30 min and 6 h postbiopsy. There was also no significant difference between groups once coping style was added into the analysis. The study failed to show any advantage in providing additional information to subjects before liver biopsy, regardless of coping style.

Key Words: Anxiety; Coping style; Needle liver biopsy

Biopsy of the liver remains an important diagnostic procedure in the management of hepatobiliary disorders and is the gold standard by which other diagnostic modalities for liver disease are assessed (1). The procedure is invasive and may be painful for patients, as found in up to 30% of cases (2). During the course of liver diseases such as hepatitis B virus, hepatitis C virus (HCV) and autoimmune hepatitis, and in the course of procedures such as liver transplantation, repeated liver biopsies may be necessary for patient management (3). It is clear that maximal effort should be used to reduce the anxiety level and the pain associated with liver biopsy to ensure that patients go through with this crucial procedure. Unfortunately, the data in the literature concerning anxiety and pain associated with needle liver biopsy are very limited.

L'effet du niveau d'information et des modes d'adaptation sur la douleur et l'anxiété en cas de biopsie hépatique à l'aiguille

La biopsie du foie est une importante intervention diagnostique. Elle est effractive et peut être douloureuse pour les patients. On ne peut utiliser de sédatifs, car la chute de la tension artérielle qui s'y associe imite l'hémorragie, une complication majeure de l'intervention. Des techniques cognitives et comportementales ont été utilisées pour atténuer le stress ressenti par les patients qui subissent d'autres interventions médicales. Dans le cadre de la présente étude, on a postulé que de l'information au sujet de l'intervention et des sensations ressenties pourrait réduire le taux d'anxiété des patients. Les modes d'adaptation des patients ont été évalués, de même que le niveau d'anxiété et de douleur selon l'échelle visuelle analogue. Les sujets ont été répartis aléatoirement entre deux groupes. Le groupe témoin a reçu de l'information de base au sujet de l'intervention. Le groupe à l'étude a reçu la même information de base, suivie d'information plus détaillée. Les sujets ont également rempli le sondage d'opinion sur la santé de Krantz, un court questionnaire utilisé pour classer le mode d'adaptation des sujets selon la catégorie de ceux qui recherchent l'information et ceux qui évitent l'information. Soixante-quinze sujets (38 sujets témoins et 37 sujets à l'étude) partageant des données démographiques similaires ont participé à l'étude. Aucune différence importante n'a été constatée en matière de niveau d'anxiété ou de douleur, 30 minutes et six heures après la biopsie. Par ailleurs, on n'a constaté aucune différence significative entre les groupes après l'ajout des modes d'adaptation à l'analyse. L'étude n'a pu démontrer d'avantages à fournir de l'information supplémentaire aux sujets avant la biopsie du foie, quel que soit leur mode d'adaptation.

It was shown that increased levels of preoperative stress may result in several disadvantageous effects. It may be associated with reduced tolerance and augmented adverse effects during the procedure itself, as well as with a relatively longer and more difficult recovery (4). Unfortunately, traditional analgesics used to decrease discomfort during procedures are unsuitable for use in liver biopsy. The sedative effects of drugs such as meperidine and midazolam can interfere with patient cooperation. The associated drop in blood pressure can mimic traumatic hemorrhage which is one of the major complications of liver biopsy (1).

Cognitive and behavioural techniques have been used to decrease stress in patients undergoing medical procedures (5). Providing patients with technical information on the

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procedure (procedural information), as well as describing the sensations that they are likely to experience (sensory information) may reduce the anxiety associated with it. However, the published data are controversial. It was shown that sensory information was effective in reducing patient anxiety but only when it corresponded to the individual patient coping styles (6). Whether patients will benefit from additional information depends on their coping styles described as information-avoiding or information-seeking. Others suggested that providing patients with sensory information before surgical procedures is not advantageous to the changes in anxiety and pain levels (7).

The present study was conducted to assess a method to reduce the anxiety and pain levels associated with the needle liver biopsy procedure. Liver biopsy is an invasive procedure. To minimize discomfort, local anesthetic is used. In principle, it resembles the anesthesia used in gastrointestinal endoscopic procedures rather than the deep anesthesia used in surgical procedures. Therefore, based on the data presented above, we believed that providing educational information would be beneficial. In the current study, we postulated that providing procedural and sensory information may reduce patient anxiety levels compared with levels achieved with the basic explanation provided in the informed consent sheet. As a secondary objective, we evaluated patient coping styles and assessed their anxiety levels and pain by using a visual analogue scale (VAS). The aim was to address the factors that influence patient pain and anxiety levels and to improve patient experiences without pharmaceutical intervention.

PATIENTS AND METHODS

The subjects for the present study were patients undergoing consecutive liver biopsy at the Jewish General Hospital (Montreal, Quebec). All subjects signed an informed written consent form to participate in the study. A single hepatologist provided patients with basic information about the procedure and the expected major adverse events. The basic information described only the elementary steps involved in performing a liver biopsy which were: finding the area for the biopsy (using ultrasound), cleansing the skin, injecting local anesthesia, minor cutting of the skin and inserting a biopsy needle. Subjects were then randomly assigned to one of two groups by a coin toss (heads representing the experimental group). The physician performing the biopsy was blinded as to which group the patient belonged. All subjects in the experimental group received extended educational information from the same trained nurse. The involved physician verified the quality and the consistency of her explanations by asking the nurse to present her descriptions to him before she faced the patients. The educational explanation of the liver biopsy procedure lasted 20 min to 30 min and began with a short review of the liver's anatomy. This was followed by a detailed explanation using a liver image which described the technique applied in each step of the procedure. The tools and materials that would be used were also reviewed. Additionally, the nurse discussed the type, timing and location of the pain that could be expected with and following the procedure. The subjects were asked not to take any nonsteroidal anti-inflammatory drugs or anxiolytics 10 days before the procedure. The biopsy was performed by an experienced hepatologist (over 150 liver biopsies per year in the last 10 years), three to four weeks after the initial information session. The liver biopsy was ultrasound-guided and was performed

through an intercostal percutaneous route. Lidocaine 2% was used as the local anesthetic in all subjects for skin and deeper tissue (approximately 10 mL each). The biopsy was performed using a 1.4 mm Menghini-type needle.

Before undergoing the biopsy, subjects were asked to fill out a short questionnaire with detailed demographic information such as age, sex, place of birth and socioeconomic status.

Subjects also filled out the Krantz Health Opinion Survey (KHOS), a short questionnaire that is validated as a tool to classify subject coping styles as either information-seeking or information-avoiding (8). In the KHOS, patients are asked to agree or disagree with seven statements regarding their choices in medical care and information. Scores ranged from zero to seven. Low scores (zero to three) indicated information-avoiders. High scores (four to seven) indicated information-seekers. The values used to define the categories above were based on a study that investigated health behaviour and information preference in medical care regarding healthy college students (8). It was validated by the same investigators on a smaller group of healthy college students (8).

On the day of the biopsy, subjects were asked to answer a number of questions before and after the procedure, including some about their pain and anxiety levels. Pain level, which was the major outcome, was measured twice, 30 min and 6 h following the procedure. If a patient received acetaminophen immediately after the biopsy but before the first assessment, he or she was asked to describe the level of pain before taking the acetaminophen. Most of these questions were answered using a VAS ranging from zero (not at all) to 10 (very much).

Statistics

Continuous variables were compared using an unpaired *t* test to compare control and experimental groups for the primary analysis. As a secondary analysis, interactions between the experimental and control subjects coping style were compared by stratifying coping styles and comparing experimental and control groups within each style separately.

Pilot data for sample size calculations were not obtained. A priori, it was felt that for the overall comparison between groups, a two-point difference in the VAS for pain, anxiety and willingness to undergo the procedure again would be the minimal clinically important difference (MCID). A two-point difference, for example, represents a 20% difference in the case of a maximal score of 10 points and a 50% difference in the case of a four-point score in the pain scale. This MCID has been used by others as well (9). The scores in the control group were 3.3 ± 2.4 for pain, 5.7 ± 3.4 for anxiety and 6.0 ± 4.3 for willingness to undergo the procedure again. Given the sample size and MCID, and using the control data as the predicted SD for both groups (a conservative estimate in this situation), the power of the current study was 96.4% for pain, 76.9% for anxiety and 55.6% for willingness to undergo the procedure again. However, given the unanticipated low level of pain, it is important to note that only 46.8% power was used to detect a one-point difference for pain. Statistics were calculated using StatView (SAS Institute Inc, USA) and power calculations were done using power and sample calculations version 2.1.30.

RESULTS

Eighty-eight subjects were approached for the study. Five patients refused to participate. Eighty-three subjects who gave informed written consent were included in the study. Finally, the data of 75 subjects who fully completed the questionnaires were analyzed, 38 subjects in the control group

TABLE 1
The demographic data of the subjects in the control and experimental groups

Demographic data	Control	Experimental
Patients (n)	38	37
Mean age (years)	43.6±9.5	42.2±10.1
Men (%)	72	73
Origin (n)		
North American/Europe (Caucasian)	26	28
Asian	10	8
African	2	1
Mean education in years	13.5±2.5	13.6±2.3
Profession (n)		
Perform knowledge work	23	22
Perform manual labor	13	14
Unemployed	2	1
Marital status (n)		
Married	23	22
Single	14	12
Divorced	1	3
Etiology of liver diseases (n)		
Hepatitis C virus	25	24
Hepatitis B virus	7	6
Steatosis	6	6
Autoimmune hepatitis	0	1

and 37 in the experimental group. The distributions of age, sex, origin, type of profession, marital status and years of formal education were not significantly different between the groups. The sex breakdown was 73% men and 27% women. The mean age was 42.2±10.1 years in the experimental group and 43.6±9.5 years in the control group (Table 1).

There was no significant difference between the control and the experimental groups in the pain levels reported 30 min following the procedure (3.3±2.4 versus 3.0±2.5 respectively, $P=0.61$) or 6 h later (1.3±1.9 versus 1.2±2.0 respectively, $P=0.75$). There was also no difference between control and experimental groups with regard to understanding the need for and the technique of the liver biopsy (7.0±2.6 versus 7.7±2.2 respectively, $P=0.18$), level of anxiety (5.7±3.4 versus 6.4±2.9 respectively, $P=0.39$) and the willingness to have the biopsy again (6.0±4.3 versus 6.1±3.9 respectively, $P=0.91$).

The subjects were subdivided in the two groups according to whether they exhibited an information-avoiding or information-seeking coping style (Table 2). Each group contained 17 to 20 subjects (eight subjects did not fill in the KHOS and some had additional missing data). There was no significant difference between the groups regarding level of pain following the procedure, understanding the procedure, anxiety levels and willingness to have a repeat biopsy in the future.

DISCUSSION

Our results showed that the addition of procedural and sensory information before undergoing liver biopsy did not change the level of pain, anxiety or willingness to repeat a biopsy between the groups. By subdividing the subjects further according to coping style, there was still no statistically significant difference observed between the groups.

TABLE 2
Mean visual analogue scale scores of the major and secondary outcomes of the study in information-avoiders and information-seekers without (control) and with (experimental) intervention

Groups	Control	Experimental	P
Avoiders (n)	20	17	
Pain level in 30 min	3.3±2.1	3.0±2.0	0.64
Pain level in 6 h	1.9±2.5	0.77±1.1	0.07
Understanding	6.6±2.9	7.4±2.3	0.36
Anxiety level	5.4±3.2	6.2±3.2	0.45
Willingness to repeat	6.4±4.1	5.8±3.7	0.68
Seekers (n)	18	20	
Pain level in 30 min	3.3±2.1	3.0±2.0	0.65
Pain level in 6 h	0.78±0.73	1.7±2.7	0.16
Understanding	7.4±2.4	7.8±2.2	0.57
Anxiety level	6.2±3.8	6.2±2.7	0.96
Willingness to repeat	5.7±4.6	5.9±4.2	0.89

Our hypothesis was that by providing more information, we would reduce patient anxiety and pain, as shown in previous studies for other procedures (4-6). Moreover, we tried to identify a specific subgroup that may benefit more from that intervention, namely, information-seekers (5). The intervention required a significant time investment from a nurse who was an expert in liver diseases, treatment modalities and procedures. Our results showed no advantage to our patients despite this intervention.

Upon reviewing the available literature, it appears that the idea of providing information before invasive procedures for the purpose of reducing anxiety and pain is controversial. Moreover, other behavioural interventions have been suggested. van Vliet et al (10) provided information to subjects undergoing gastroenterological procedures according to their coping style. This intervention showed no benefit in comparison with results from the control group. Miro and Raich (7,11) split surgical patients into three groups. The control group received basic preparation. The second group received additional sensory information according to the individual patient coping styles. The third group was trained in relaxation. No benefit was seen in the experimental group that received the extra information versus in the control group. However, patients who were trained in relaxation reported less pain and quicker activity resumption following the surgery. Finally, Morgan et al (6), who used the KHOS to define subject coping styles, showed that information-seeking patients who were given additional information before undergoing colonoscopy experienced less anxiety, less pain and spent less time in the recovery room.

The results of our study were consistent with those of others (7,10,11) which showed that providing additional sensory information before invasive procedures was not beneficial.

There was an unexpected (but not statistically significant) trend among the information-avoiders. Six hours after the biopsy, information-avoiders in the control group reported more pain than the information-avoiders in the experimental group. Contrary to the work from Krantz et al (8), our results suggest that it is possible that knowledge can benefit information-avoider types if the pain assessment does not immediately follow the event.

The failure of the intervention to show statistically significant results could be due to the particular explanation

provided. Another factor could be providing acetaminophen for pain following the biopsy. However, only a few patients demanded the medication and it was only given shortly after the procedure. In cases where subjects received acetaminophen, they were asked to quantify the maximal pain they experienced before the medication was administered. Small groups could be another cause for statistical nonsignificance. However, the sample size calculations were based on the MCID because no pilot data for the procedure were available, as discussed in detail earlier. Additionally, it is possible that the KHOS is not applicable to patients undergoing liver biopsy procedures. It is also possible that the latency between the information session and the procedure itself rendered the intervention less

effective. Finally, most of the study subjects had HCV. It was reported that among patients with HCV, there is a greater extent of myalgia and fibromyalgia (12). In other words, more of these subjects complained of chronic somatic pain. Therefore, it is possible that providing sensory information to this group of patients was ineffective regardless of subject coping styles.

CONCLUSION

It appears that relaxation training may be a better intervention for pain and anxiety reduction than detailed information, with or without regard to coping style (7,11). It is a cost-effective intervention that could be investigated as another method to reduce pain and anxiety in liver biopsy in future studies.

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