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Pain and anxiety during bone marrow aspiration/biopsy: Comparison of ratings among patients versus health-care professionals

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A B S T R A C T

Purpose: To assess pain and anxiety during bone marrow aspiration/biopsy (BMA) among patients versus health-care professionals (HCPs).
Method: 235 adult hematologic patients undergoing BMA were included. BMA was performed by 16 physicians aided by nine registered nurses (RNs). Questionnaires were used to obtain patients and HCPs ratings of patients' pain and anxiety during BMA. Patterns of ratings for pain and anxiety among patients HCPs were estimated with proportions of agreement P(A), Cohen's kappa coefficient (κ), and single-measure intra-class correlation (ICC). We also explored if associations of ratings were influenced by age, sex, type and duration of BMA.
Results: The P(A) for occurrence of rated pain during BMA was 73% between patients and RNs, and 70% between patients and physicians, the corresponding κ was graded as fair (0.37 and 0.33). Agreement between patients and HCPs regarding intensity of pain was moderate (ICC = 0.44 and 0.42). Severe pain (VAS > 54) was identified by RNs and physicians in 34% and 35% of cases, respectively. Anxiety about BMA outcome and needle insertion was underestimated by HCPs. P(A) between patients and RNs and patients and physicians regarding anxiety ranged from 53% to 59%. The corresponding κ was slight to fair (0.10–0.21). ICC showed poor agreement between patients and HCPs regarding intensity of anxiety (0.13–0.36).
Conclusions: We found a better congruence between patients and HCPs in pain ratings than in anxiety ratings, where the agreement was low. RNs and physicians underestimated severe pain as well as anxiety about BMA outcome and needle insertion.

Introduction

Patients with cancer undergo several different and repeated diagnostic procedures during the disease trajectory. Pain caused by various procedures and situations is defined as procedural pain, i.e. an acute increase or sudden onset of pain with short duration (Heafield, 1999). Among the most painful procedures are those when instruments or devices are inserted into the body, usually by cutting or puncturing the skin (Coutaux et al., 2008). In a recent study, pain was evaluated in cancer patients undergoing different types of invasive examination. The highest pain levels were related to the procedures bone marrow aspiration/biopsy (BMA), lumbar puncture and insertion of central venous catheter (Portnow et al., 2003).

BMA is commonly performed in hematological patients to confirm diagnosis and to evaluate response to therapy. In adult patients, local infiltration anesthesia is routinely applied before BMA (Kuball et al., 2004). Previously, we conducted a prospective longitudinal study on procedure-related pain among adult hematologic patients who underwent BMA (Liden et al., 2009). Similar to prior studies (Dunlop et al., 1999; Vanhelleputte et al., 2003; Kuball et al., 2004; Steedman et al., 2006), we found BMA-related pain to be common: 70% of the patients reported pain during BMA and 35% reported severe-to-worst-possible pain (Liden et al., 2009).

Reasons for not preventing pain related to BMA may depend on health-care professionals' insufficient knowledge of procedural pain, or on inadequate pain analysis (Field, 1996; Drayer et al., 1999; Sjostrom et al., 1999; Puntillo et al., 2003). Another possible barrier

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to efficient pain treatment may be poor congruence of the ratings for pain among patients versus health-care professionals (Drayer et al., 1999). Health-care professionals' estimates of cancer patients' pain commonly diverge from the patients' own experience (Grossman et al., 1991; Sneeuw et al., 1999; Kuball et al., 2004; Budischewski et al., 2006). Health-care professionals seem to overestimate mild pain and underestimate severe pain (Grossman et al., 1991; Kuball et al., 2004; Budischewski et al., 2006). Anxiety often co-exists with and exacerbates the perception of pain (Ozalp et al., 2003). A poor correlation between cancer patients' and health-care professionals' assessments of anxiety is also reported (Badner et al., 1990; Heikkila et al., 1998; Martensson et al., 2008).

Although poor agreement between patients' and health-care professionals' ratings of cancer patients' pain and anxiety is recognized, to our knowledge, there is limited empirical research focusing on procedures. Procedures are often associated with considerable discomfort and pain (Portnow et al., 2003) why such knowledge would be of value for adequate symptom management. The aim of the present study was to assess ratings for pain and anxiety during BMA among patients versus health-care professionals. Also we explored whether patterns of ratings were influenced by the patients' age or sex, as well as the type and duration of BMA.

Methods and material

Subjects

Two hundred thirty-five (median age 62 years, range 20–89 years) of 263 (89.4%) consecutive adult patients scheduled for BMA at the outpatient clinic of the Division of Hematology, Karolinska University Hospital, were included (Table 1). Patients could only be enrolled once. Inclusion criteria were age 18 years or older and with a scheduled BMA. Exclusion criteria were mental disorders and linguistic difficulties, unwillingness to participate, not showing up on time for the BMA, sedative medication, or fainting before BMA. Informed consent was obtained from all patients prior to study enrollment. The study was approved by the Regional Ethics Committee in Stockholm.

Table 1
Patients' characteristics.

Variable		
Total number, *n* (%)	235	(100)
Age, median years (range)	62	(20–89)
Sex, *n* (%)		
Female	109	(46)
Male	126	(54)
Underlying diagnosis according to BMA, *n* (%)		
Leukemia	34	(14)
Multiple myeloma	39	(17)
Lymphoma	46	(19)
Myelodysplastic syndrome	18	(8)
Chronic myeloproliferative disorder	31	(13)
Other hematologic disease	42	(18)
Non-hematologic disease	25	(11)
Previous BMA, *n* (%)		
No previous BMA	100	(43)
1–2 times	76	(32)
3–5 times	27	(11)
>5 times	32	(14)
Site of BMA, *n* (%)		
Posterior iliac crest	230	(98)
Sternum	5	(2)
Type of BMA, *n* (%)		
Bone marrow aspiration	67	(28)
Bone marrow biopsy	88	(37)
Both aspiration and biopsy	80	(35)

The BMAs were performed by nine attending hematologists and seven hematology fellows (female $n = 10$, male $n = 6$). Twenty-six percent of the BMAs were performed by attending hematologists and 74% by hematology fellows. Seven out of nine attending hematologists and six out of seven hematology fellows had performed more than 100 BMAs previously. Nine RNs assisted the physicians during the BMAs. All the RNs were female with a median of four years (range 1–19 years) of professional experience.

Bone marrow aspiration/biopsy

As pain relief, a local anesthetic (Lidocaine 1% 10–20 ml) was given subcutaneously as well as with periostal infiltration. After local anesthesia, BMA was carried out using a 15 gauge × 2.7 inch aspiration needle and/or 11 gauge × 4 inch biopsy needle (Medical Device Technologies, Inc).

Data collection

Self-administered questionnaires were used to obtain information about pain and anxiety from the patients (Liden et al., 2009) and to assess physicians' and RNs impressions of patients' experience of pain and anxiety.

Questionnaires to patients

Prior to the BMA, the patients answered a study-specific questionnaire including questions concerning anxiety about BMA needle insertion and BMA outcome. First, the presence or absence of anxiety was recorded. Thereafter the intensity of anxiety was scored on Visual Analog Scales (VAS) ranging from 0 to 100 mm anchored 0 mm = no anxiety and 100 mm = worst possible anxiety. The participants were requested to mark the point on each line that best agreed with their experience of anxiety.

Ten minutes after the BMA, a second study-specific questionnaire about pain during the procedure was completed by the patients. First, presence or absences of pain was recorded. Then, the intensity of pain was scored on VAS with 0 mm = no pain and 100 mm = worst possible pain. Intensity > 30 mm on VAS was considered to represent moderate pain and VAS > 54 mm severe pain (Collins et al., 1997).

Questionnaires to physicians and registered nurses

The physicians performing the BMAs and the assisting RNs individually filled out a questionnaire immediately after completion of each BMA. They recorded their assessments of the patient's pain during the BMA, anxiety about the needle insertion and anxiety about the outcome (presence or absence and intensity on VAS), without knowing the patients' responses in the patient questionnaires. Using a standardized data-entry form, physicians and RNs also recorded their own gender, and the number of years working in hematology. Physicians also recorded the estimated number of BMAs they had carried out, as well as clinical information regarding the patient.

Statistics

Associations of ratings for occurrence of pain and anxiety during BMA among patients versus health-care professionals were assessed using proportions of agreement P(A) and Cohen's unweighted kappa coefficient (κ), correcting for the eventuality that agreement could occur by chance alone. In accord with Landis and Koch (1977), the magnitude of the κ values was graded as follows: $\kappa \leq 0$ = poor; κ 0.01–0.20 = slight; 0.21–0.40 = fair; 0.41–0.60 = moderate;