۱۸۱-181J Vet Fac. Univ Teheran, Iran 43(1,2,3 and 4):1988

Radiographic studies of the gastric empiying in suckling camels

R.Z. Kermani*. A.Veshkini** M.Teshfam*
A. Karimi***

Introduction

Radiographical investigations of the gastrointestinal tract including the rate of gastric emptying, had been performed in most non-ruminant, simple stomach species such as: dogs,[4,10] Cats,[4,10] horses,[5,10] man[6,7] and also in ruminant animals.

Apart from many valuable investigations done in this respect, using gastrointestinal fistula and electromyography, the radiological studies on polygastric animals started as early as 1929 by Czepa and Stigler[3] whose results stimulated others to continue investigatins. Since then this kind of experiments on Ruminantia were limited to small ruminants, particularly sheep and goat and the main pupose behind them, were diagnosis of some

* Department of Basic Sciences Faculty of Veterinary Medicine, University of Tehran.
** Department of Clinical Sciences,Faculty of Veterinary Medicine,University of Tehran.
*** Department of Clinical Sciences,Faculty of Veterinary Medicine Urmia University,Urmia.

gastrointestinal disorders including: foreign bodies, hernia, displacements and so on as a valuable tool.

Phillipson (1939), Watson and Jaret(1944), Bhargava and Vig (1975), Newhooke and Titchen(1976) and Bell et al (1977) were among many others who investigated some aspects of gastrointestinal anatomy and physiology using radiography.

Among polygastric animals, Tylopoda and particularly suckling camel received very limited attention from the point of view of gastric functioning and its transit time. Since this species plays an important role in rural economy in the Middle East and as there are some behavioural and anatomo-histological differences existing between this species and Ruminantia, following study was designed and performed.

Materials and Methods

3 male suckling, one humped camel (Camelus dromedarius) were purchased and used when about 7 days old. The animals were bottle fed from the provided camels milk 3 times a day and they were fasted for 12 hours prior to radiography.

In order to be acquainted with different compartments of the upper digestive system of the animals, plain right and left recumbent lateral and ventro-dorsal radiographs were taken before giving barium meal.

Mixture of barium sulphate and camel's milk (10%)was prepared and used as barium meal.The meal was given at a

rate of 10-20 ml/Kg. body weight.

Right, left recumbent lateral radiographs were taken immediately and every 20 minuts untill the initial emptying time of the abomasum (IETA) reached and then every hour untill total emptying time of the abomasum (TETA) occurred.

Exposure factors were 70Kv, 40 mAs, using fast Toshiba intensifying screen and fast Agfa films (AGFA-GEVERT, Curix RP1) with Bucky was on.

Results

Plain recumbent lateral radiograph (Fig 1) shows different compartments of the stomach to be filled with swallowed air which acts as a negative contrast media and in some parts showed linear increase in density probably resembling folds of water sacs of the rumino-reticular compartments. Omaso-abomasum plus rumino-reticulum are also visible and on the whole it seems possible to distinguish partially different gastric compartments in this radiograph.

There was no trace of reticular groove functioning immediately after giving barium meal to the experimental animals. Mineral density of barium suspension at the given rate of barium meal (10ml/Kg. body weight), 20 minutes following the administration is shown in Fig.2. The figure shows that the amount of given radiopaque was not sufficient and the materials was diluted in different compartments of the stomach. It filled slightly rumino-

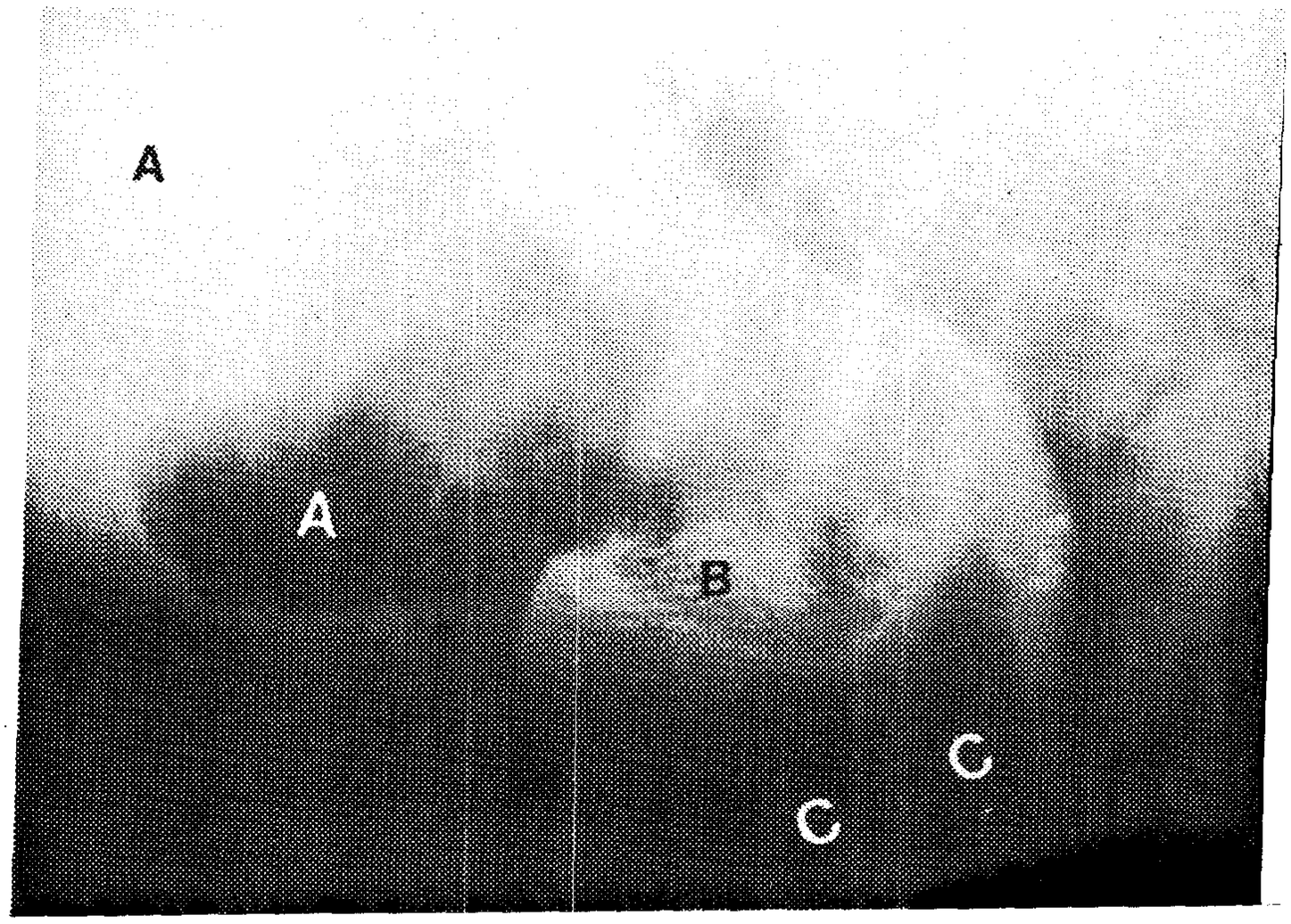

Fig.1-Plain radiograph.

A=Rumino-reticulum.,B=Water sacs.,

C=Omaso-abomasal compartment.

reticular compartment, specially water sacs. The omaso-abomasal compartment is also poorly visible and as the amount of barium meal was insufficient, it was passing as small bulk at a time, so it was not possible to record the exact ITEA and subsequently TETA.

Second set of experiment was performed in which 20ml/ Kg. body weight of barium meal was given and 3 animals were used.

The lateral radiographs taken immediately after barium meal administration showed that barium filled different compartments and the experimental animals did not show reticular groove reflex as is shown in Fig.3.

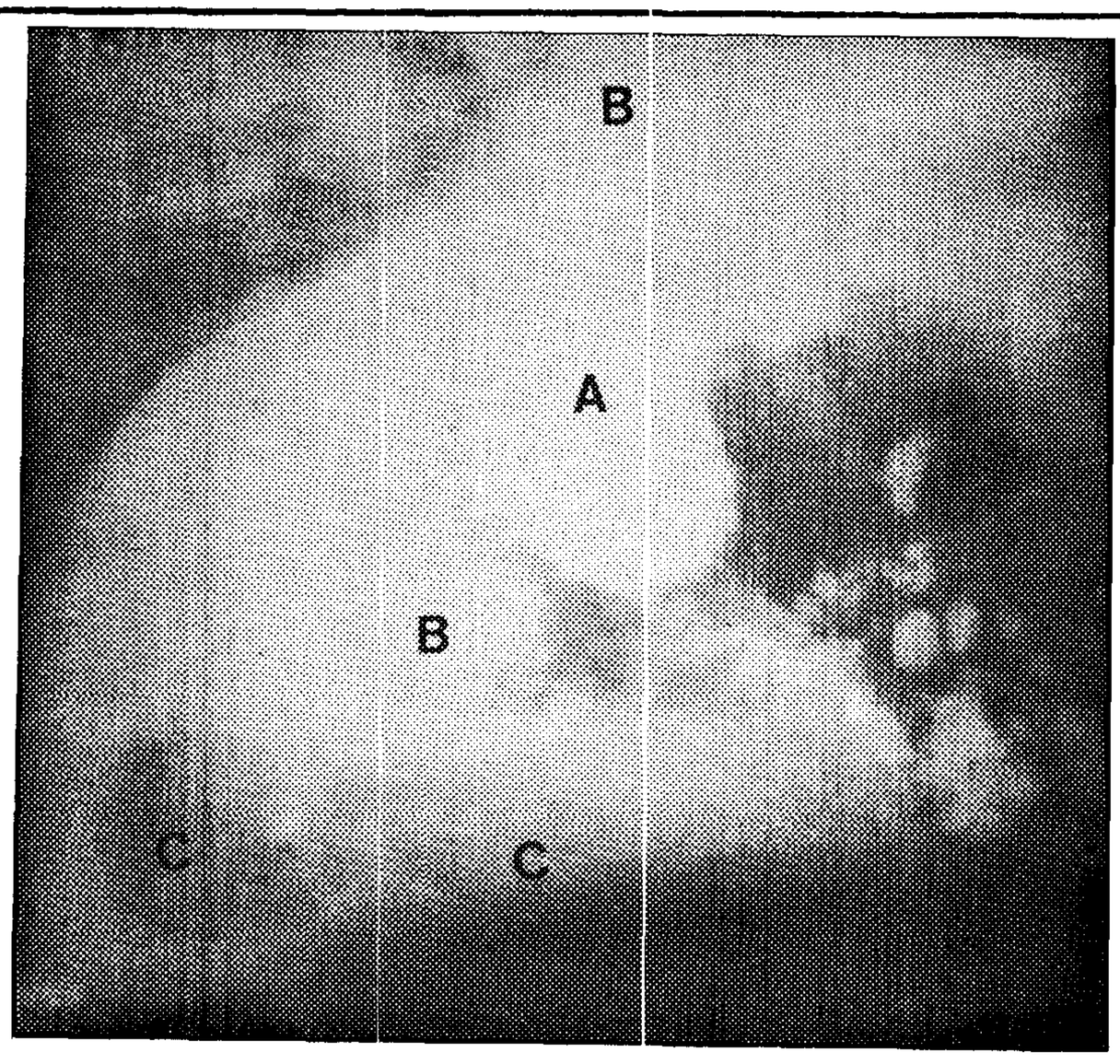

Fig.2-Lateral radiograph taken 20 minutes following barium meal administration showing inadequate filling of different gastric compartments. A=Rumino-reticulum., B=Water sacs.,C=Omaso--abomasal compartment.

Lateral radiographs taken 160 minutes after barium administration showed that the most of the contrast media filled omaso-abomasal compartment with little amount of opaque materials in the reticulo-rumen and almost emptying of water sacs which is shown in Fig.4.

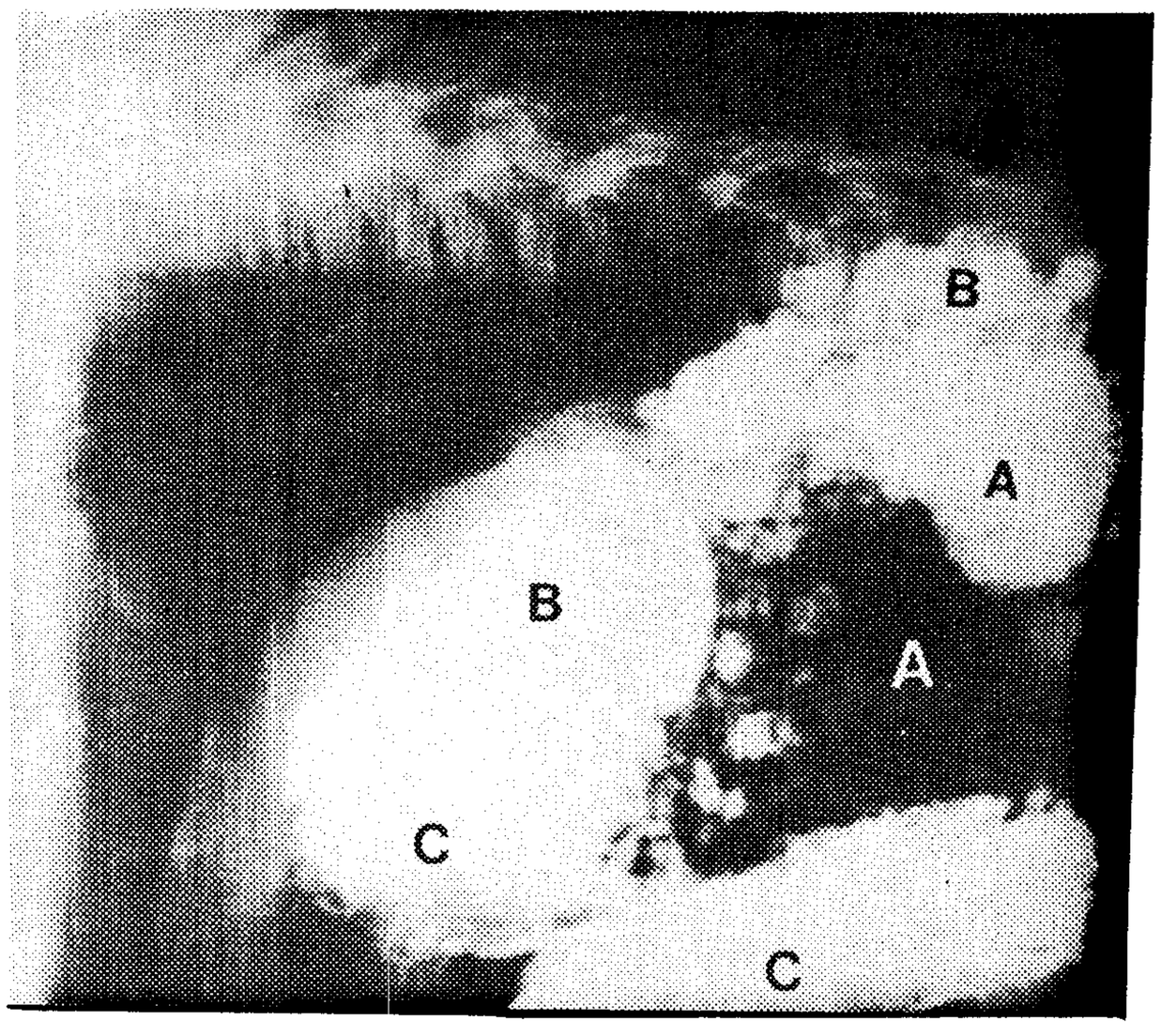

Fig. 3-A=Rumino-reticulum.,B=Water sacs.,C=Omaso-abomasal compartment.

Notice=A part of omaso-abomasal compartment is superimposed on the lower water sac.

Lateral radiographs taken 3 hours after barium administration showed regurgitation of the contrast media back into reticulo-rumen and water sacs and still there is no sign of the passage of the radiopaque meterials into the duodeneum. (Fig.5).

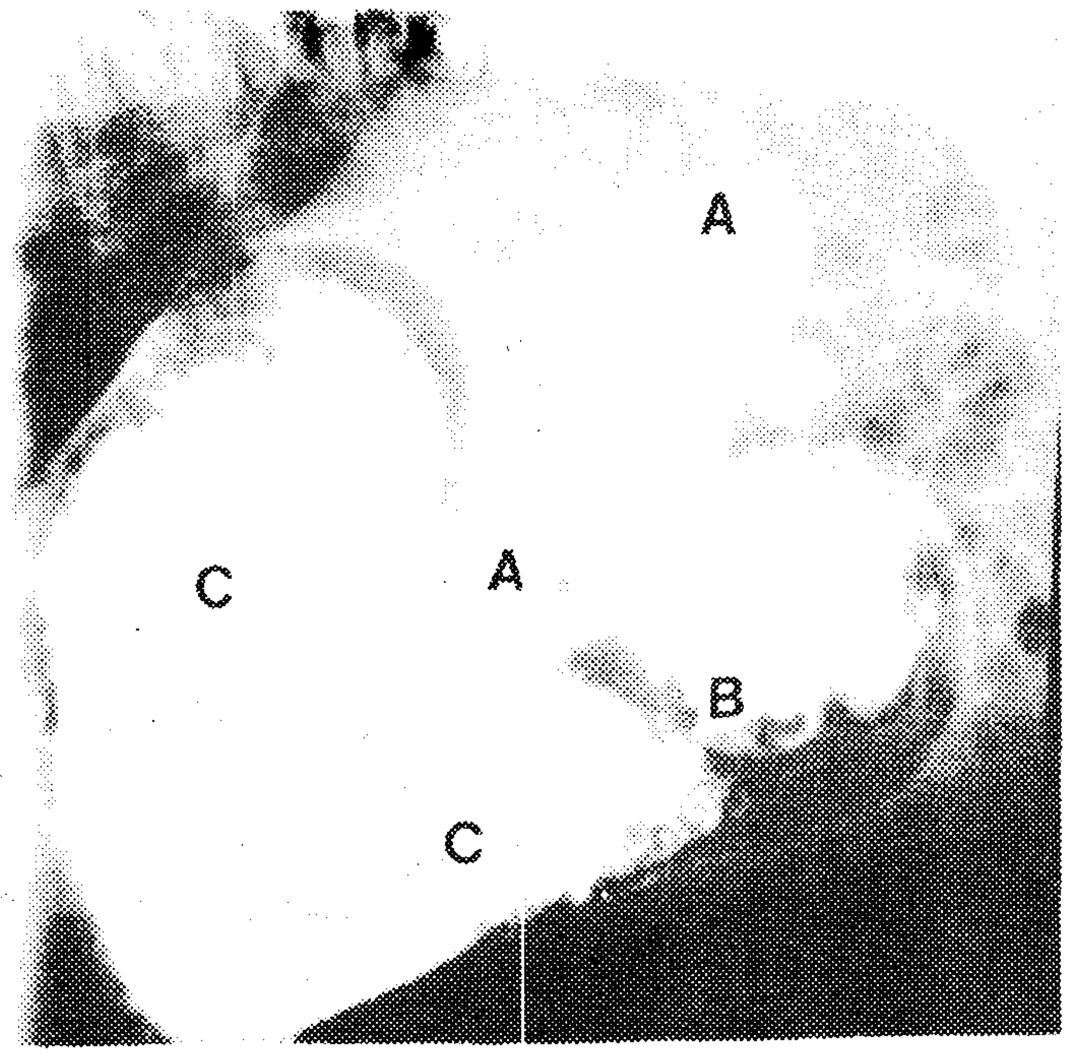

Fig.4-Radiograph taken 160 minutes following barium meal administration.

A=Rumino-reticulum and water sacs.,B=Reticulo-omasal orifice., C=Omaso-abomasal compartment.

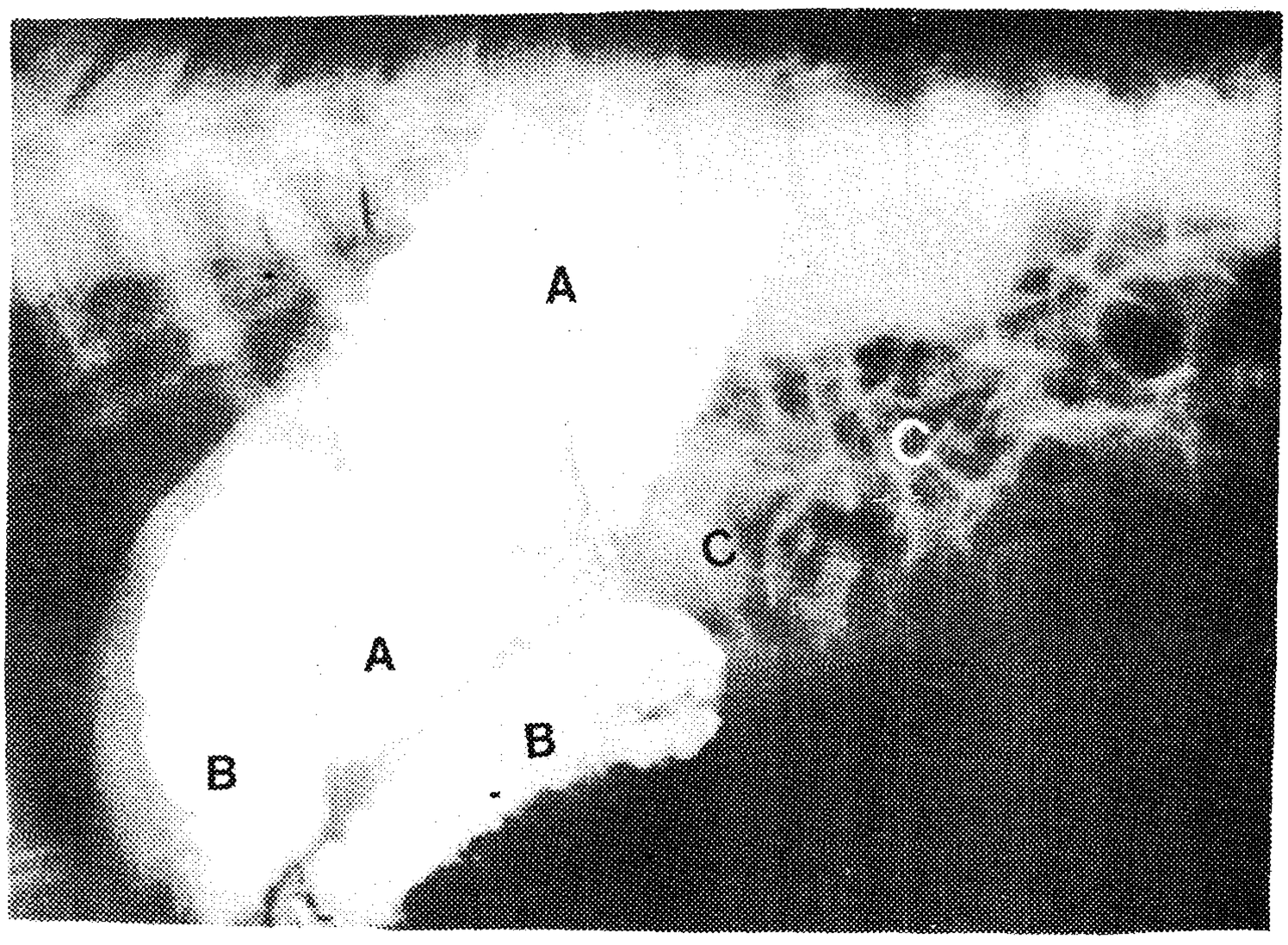

Fig.5-A=Water sacs and rumino-reticulum.,B=Omaso-abomasal compartment., C=Small intestine.
Notice=The amount of barium increased again in reticulo-rumen and water sacs and decreased in omaso-abomasal compartment.

Lateral radiographs taken 5 hours after barium administration showed initiation of the abomasal emptying and again some backward movement of the contrast media to the reticulo-rumen and their corresponding water sacs as shown in Fig.6.

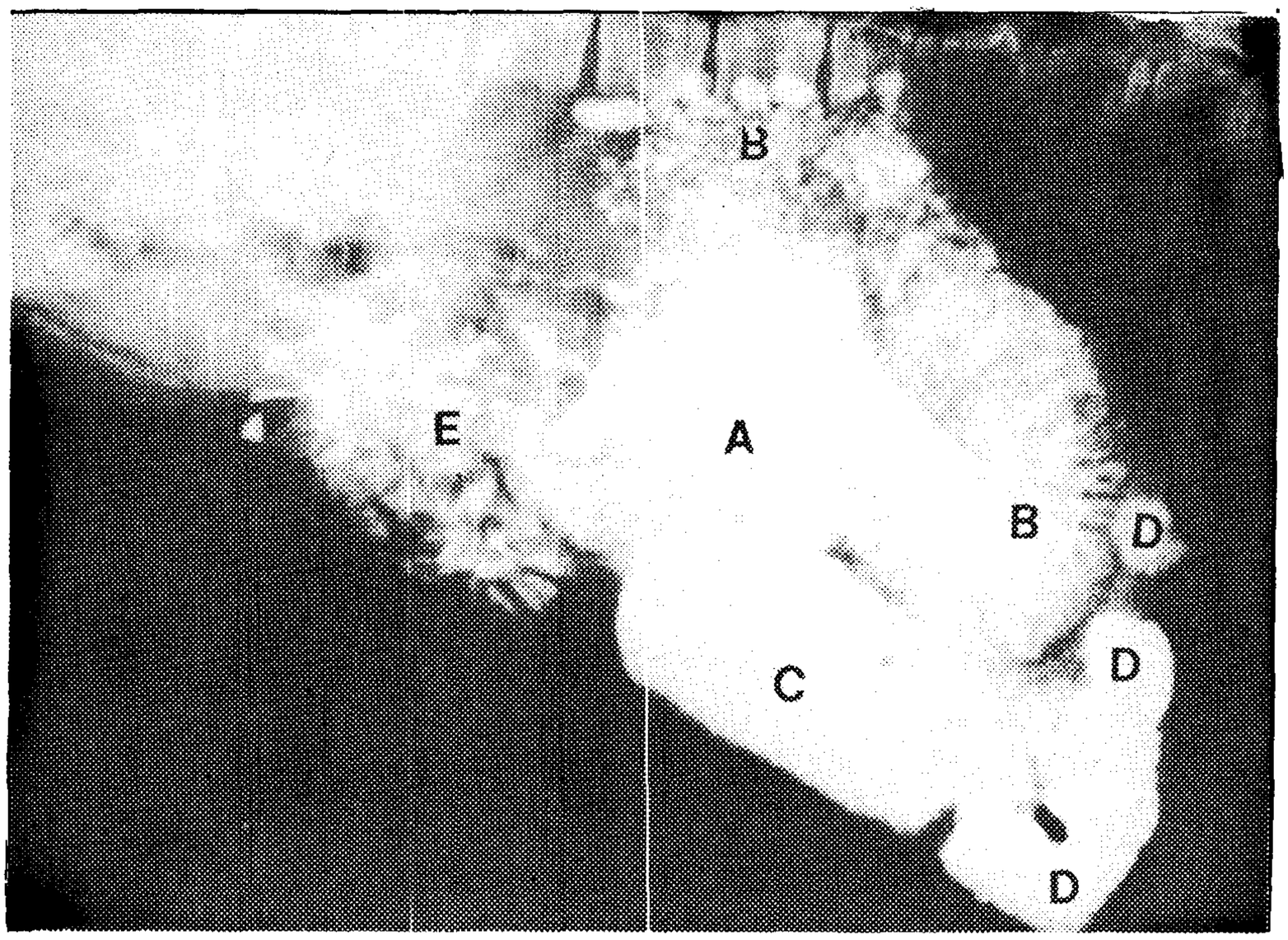

Fig.6-A=Rumino-reticulum, B=Water sacs. C=Omaso-abomasal compartment., D=Pyloric antrum and sphincter., E=Small intestine.
Notice=TETA is well demonstrated.

Lateral radiographs taken 24 hours after barium administration showed complete emptying of abomasal compartment with little trace of the contrast madia in different parts of the stomach. Almost all the barium are seen in the large intestine which is shown in Fig.7.

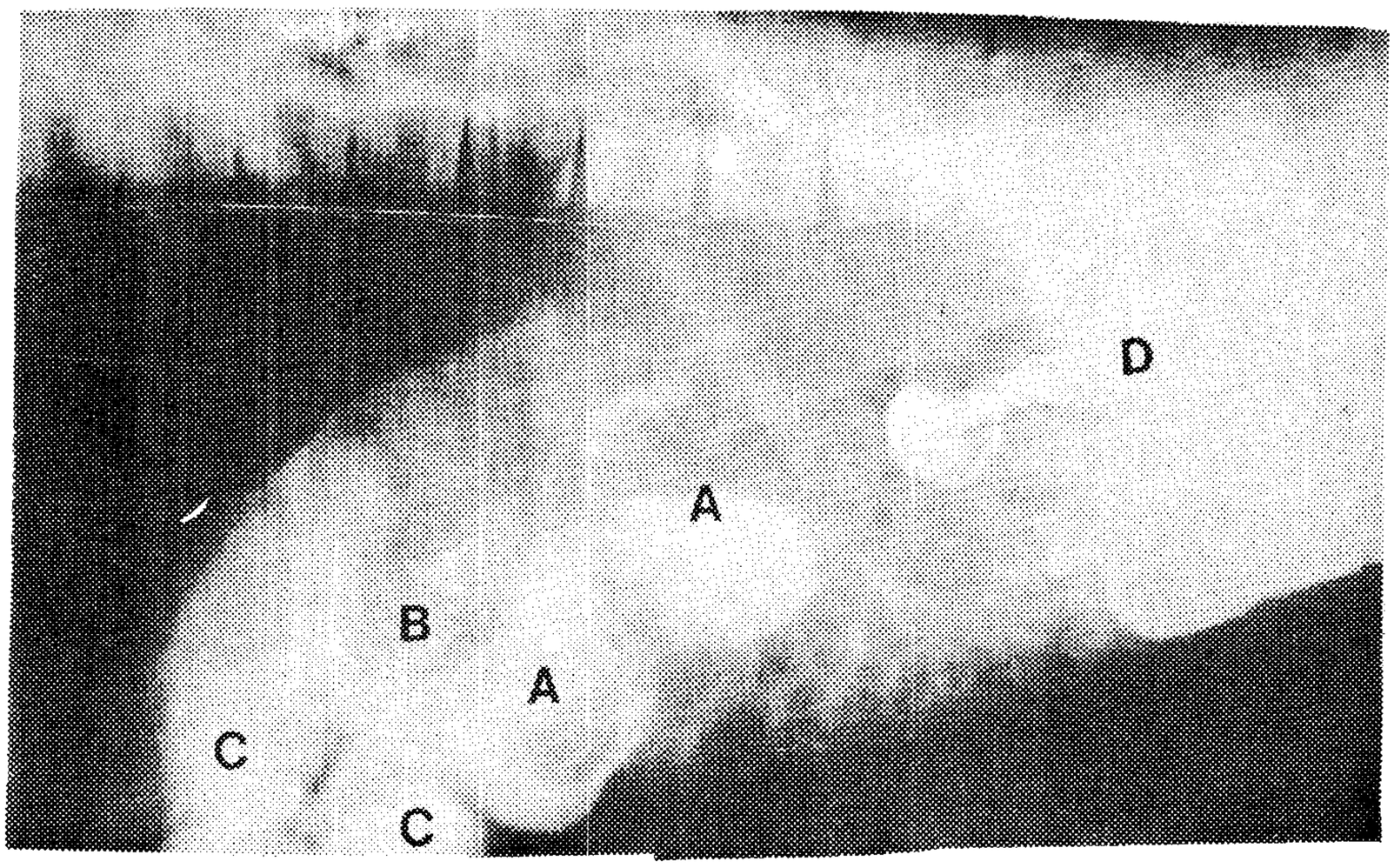

Fig.7-A=Rumino-reticulum., B=Water sacs.,C=Omaso-abomasal compartment., D=Large intestine. Notice=TETA is well demonstrated.

Discussion

In dogs, cats, foals and calves positive and negative upper gastrointestinal radiography mostly contributes to the diagnostic purposes.[3,4] In this study a technique for contrast upper gastrointestinal radiography in young camel was evaluated.

The dosage of 20ml/Kg. body weight of a suspension of barium sulphate, 10 per cent in camels milk was found to be adequate to show the gastrointestinal tract.

Recommended timing sequence for contrast radiography are: immediately and every 20 minutes untill IETA and then every hour untill TETA reached.

Radiographic positionings that were found most valua-

ble to evaluate the movements of the ingesta through different compartments of the stomach were left and right recumbent lateral in these animals.

In the present study IETA was found to be about 5 hours after feeding the barium meal and TETA of about 24 hours. The latter had been reported to be about 2 hours in foals[5],1-4 hours in cats and dogs[4,6] and 1-3 days in milk fed calves[1].

In young nursing ruminants, it has been shown that regurgitation of abomasal contents through the omasal canal to the reticulum sometimes occurres[10].This seems to be similar to the aboral movements of the opaque materials in the different compartments of the stomach during 5 hours after giving barium meal and later on to the experimental animals.

In the young ruminants that only receive liquid materials, food is directed into the abomasum via omasal canal by the physiological functioning of the reticular groove, which is activated by suckling reflex and the animals appetite and eagerness to do so[8,9,10]. In the present study, the young camels refused to show such effect. The animals were used to bottle feeding 3-4 days prior to the initiation of the radiographic studies,the reticular groove is present and the omasum is vestigeal. The experimental baby camels were very choosy and perhaps sensitive to the taste of prepared barium meal. In such particular cases the meal was injected into the mouth with 50ml syringes, holding the head upright, using

gravity effect and directed the materials into the oesophagus which, perhaps excluded the efficient reticular groove reflex. Therefore it seems most probable that in the absence of suckling reflex the liquid materials had to pass through all compartments before entering the proximal small intestine.

Water sacs were filled immediately after barium administration and then during this study, interval emptying and filling of these sacs occurred untill the initiation of abomasal emptying and later on, probably showing their importance in water movements and water balance in this species.

References

1- Bell,F.R., Holbrooke, S.E. and Titchen, D.A.(1977).A radiological study of gastric (Abomasal)emptying in calves before and after vagotomy.J.Physiol.272,481-493.

2- Bell, F.R. and Webber.D.E. (1979).A comparison of duodenal osmolality and energy content as controlling factors of gastric emptying in the calf.J.Physiol. 297,379-385.

3- Bhargava.A.K. and Vig,M.M.(1975). Radiographic evaluation of gastrointestinal tract in Buffalo calves by barium meal study. Indian Vet.J.52, 936-938.

4- Brien, T.R.D.(1978). Radiographic diagnosis of abdominal disorders in the dog and cat. Radiographic inter-

pretation. Clinical signs. Pathophysiology.Saunders Company Philadelphia, USA.

5- Campbell,M.L.Ackerman, N., and Peyton, L.C. (1984). Radiographic gastrointestinal anatomy of the foal. Vet. Radiol. 25, 5, 194-204.

6- Cooke, A.R. (1975). Progress in gastroentrology.Control of gastric empyting and motility. Gastroenterology, 68, 4,804-816.

7- Ganong, W.F. (1983). Review of medical physiology. 11th ed.Lang Medical Publications. Los Altos, USA.

8- Newhooke, J.C. and Titchen, D.A. (1976).Cineradiography of the reticular groove mechanism. Australian Vet. J. 52, 132-135.

9- Newhooke, J.C. and Titchen, D.A. (1976). Caudal thorasic oesophageal activity in suckled lambs.Proceedings of the Physiological Society, 114p-115p.

10-Swenson,M.J. (1984). Ducks Physiology of Domestic Animals. 10th ed. Comstock Publishing Associates. Cornell University Press. Ithaca. USA.

۵ ــ درطول پنج ساعت پس از خوراندن سوسپانسیون سولفات باریم وحتی پس از آن بارها بازگشت مواد غذائی در خلاف جهت روده‌ای مشاهده شد .

۶ ــ باتوجه باینکه رفلکس ناودان نگاری درنوزاد شتر شیرخوار وجود دارد ولی دراین بررسی اثر مشهودی از آن دیده نشد ، شاید بدین سبب که حیوانات مورد آزمایش علاقه‌ای به‌میکدن سوسپانسیون سولفات باریم در شیر نداشتند وتعلیق مزبور توسط سرنگ درحالیکه سرحیوان بالا گرفته شده بود به بخش خلفی حلق تزریق شده وازنیروی ثقـــل جهت هدایت مواد مزبوربطرف مری استفاده‌گردید .بدین طریق با حذف پدیده فیزیولوژیک میکدن ، نتایج وابسته بدان نیز احتمالا " حذف شده است .

۷ ــ کیسه‌های آب موجود در معده بلافاصله پس‌ازخوراندن سوسپانسیون سولفات باریم پرشده ودر طول آزمایش درفواصل زمانی پروخالی می‌شدندکه احتمالا " نشاندهنده اهمیت ونقش آنها در حرکت وتغادل مایعات دراین رده جانوری است .

مجلهٔ دانشکدهٔ دامپزشکی ،دانشگاه‌تهران ،دوره (۴۳) شمارهٔ (۱و۲و۳و۴)تهران (۱۳۶۷)

بررسی های رادیوگرافیک تخلیه معده در شتران شیرخوار

دکتر رسول زنده روح کرمانی * دکتر عباس وشگینی ** دکترمسعودتشفام *
دکتر عبدالکریم کریمی ***

مطالعات رادیوگرافیک تخلیه معده دراکثر حیوانات تک معده‌ای نظیر سگ‌وگربه، اسب ،انسان وهمچنین در تعدادی‌ازنشخوارکنندگـان‌نظیر گوساله ، بره وگاومیش صورت گرفته ولی به سبب اشکالات مربوط به حصول ونگهداری وسائل تکنیکی ، علیرغم نقش و اهمیت شتردراقتصاد روستائی کشورهای خاور میانه چنین مطالعه ای هنوز صورت نگرفته است . بهمین سبب شالوده این بررسی توسط بخش های فیزیولوژی ورادیولوژی دانشکده دامپزشکی دانشگاه تهران‌ریخته‌شد ومطالعات مقدماتی روی سه نوزاد شتر شیرخوار صورت گرفت که خلاصه نتایج آن بشرح زیر است :

۱ ــ برای نشاندادن‌بخش های‌مختلف جهت‌بررسی رادیوگرفیک،خوراندن مقدار ۲۵ سانتی متر مکعب بازاء هر کیلوگرم وزن از سوسپانسیون ماده حاجب سولفات باریـــم بغلظت ده درصد در شیر شتر کافی بنظر می‌رسد .

۲ ــ تناوب زمانی‌مناسب برای اخذ فیلم های رادیوگرافیک عبارتند از :

الف : بلافاصله پس‌ازخوراندن ماده حاجب

ب : تازمان شروع تخلیه شیردان هربیست دقیقه‌یکبار

ج : تازمان تخلیه کامل شیردان هر ساعت یکبار

۳ ــ در حیوانات تحت آزمایش وضعیت های مناسب در زمان رادیوگرافی جهت نشاندادن حرکت‌مواددربخش های مختلف معده عبارت بودند از : خوابیده روی پهلوی چپ وراست .

۴ ــ شروع تخلیه‌معده‌حدودپنج ساعت پس‌ازخوراندن‌سوسپانسیون سولفات‌باریم بوده وتخلیه کامل ۲۴ ساعت پس‌ازآن‌صورت گرفت .

---

* گروه آموزشی علوم پایه ، دانشکـده دامپزشکی ، دانشگاه تهران
** گروه آموزشی علوم درمانگاهی ، دانشکده دامپزشکی ، دانشگاه تهران
*** گروه آموزشی علوم درمانگاهی ، دانشکده دامپزشکی ، دانشگاه ارومیه