

Successfully Assisting a Geriatric Elephant in Resuming Lying Rest – A Case Report

Christian Schiffmann^{1§*}, Brother Stefan^{2§}, Brother Simon², Linda Hellriegel¹ and Imke Lüders³

¹Gartenstrasse 7, 79664 Wehr, Germany

²Skandavale Monastery, Wales, United Kingdom

³Geolifes – Animal Fertility and Reproductive Research, Hamburg, Germany

[§]these authors contributed equally

*Corresponding author's e-mail: c.schiffmann.elephantproject@gmail.com

Abstract. The provision of a sufficient amount of satisfying rest is considered a critical welfare aspect in zoo animal care. According to our current knowledge, elephants require regular bouts of lying rest in order to have restorative sleep. This case report demonstrates how a geriatric and severely handicapped Asian elephant was supported successfully to resume lying rest. Through the provision of an appropriate slope to lie on, her bouts of lying rest became shorter, more frequent and more laterally balanced. At the same time her total daily duration of lying rest increased and the days without having any lying rest at all decreased.

Introduction

Although our knowledge of resting behaviour in free-ranging Asian elephants (*Elephas maximus*) remains sparse due to challenges in observing them in their natural habitat, several reports have documented their resting behaviour under human care (Tobler 1992; Ibler & Pankow 2012; Williams *et al.* 2015; Walsh 2017; Kalirathinam *et al.* 2019; Evison *et al.* 2020). Reviewing these data led to the hypothesis that lying rest is critical for elephants, because they may not have satisfying sleep in a standing position (Schiffmann *et al.* 2018a).

Whether leaning rest may function as a substitute for lying rest is debatable (Schiffmann *et al.* 2018a). In particular geriatric and/or physically handicapped elephants may struggle with the movement sequence of lying down and getting up again. Therefore, it is not surprising that such individuals express reluctance to lay down and at one point may completely stop having lying rest (reviewed in Schiffmann *et al.* 2018a).

Under the assumption that this behavioural alteration will prevent them from having satisfying sleep, it is evident that every effort should be taken in order to facilitate elephants in hu-

man care to have lying rest and thus ensure their welfare (Schiffmann *et al.* 2018a; Williams *et al.* 2018).

Here, we report how this challenging task was solved successfully in a geriatric female Asian elephant suffering from severe physical ailments.

The individual elephant and her history

The female Asian elephant “Laksmi” was wild-born around 1969 in Myanmar. After importation to England in 1973, she lived a life on the road in circuses until October 2018. At that time, she was moved to a private elephant-keeping facility to join a female housed alone. The main reason for transferring Laksmi was a number of serious physical ailments (Tab. 1), which made it impossible to perform in the circus any longer and made travelling increasingly challenging.

After the transfer, she settled in very well at the new facility and gradually bonded with the resident younger female. This development was continuously facilitated and closely monitored by a dedicated keeper team. With respect to the multiple health issues, Laksmi underwent

Table 1. Chronic health issues of the female Asian elephant Laksmi (compiled from examination reports on 11.06.2016 and 27.04.2019).

Ailment	First occurrence/ diagnosis	Prognosis	Consequence
Lens was removed in left eye due to cataract. Subsequent infection of both eyes and a lens prolapse in the right eye	Operation 19.10.2007 in Lyon	Incurable	Blindness
Stiffness of right front leg with muscular atrophy due to fused elbow joint (likely first dislocated and subsequently fused) with rotational deformity	Around 1980	Incurable	Significant lameness due to reduced range of motion, swaying leg forward without bending of any joint
Recto-vestibular fistula	Around 1990	Incurable	Feces enter the vestibulum continuously and lead to bacterial contamination with subsequent chronic cystitis, vaginitis and endometritis/pyometra
Rectal paralysis	Around 1990	Incurable	Active defecation is impossible; manual rectal evacuation by handler required every 8 h
Uterine pathologies (polyps, leiomyoma, suspicion of pyometra)	11.06.2016 and 27.04.2019	Symptomatic treatment with antibiotics	May cause recurrent hematuria and carries a constant risk of septicemia

monthly veterinary checks and was under continuous treatment with an analgesic – 2 g Phenylbutazone (Equipalazone®, Dechra Pharmaceuticals), administered orally once a day, and a variety of supporting herbal drugs.

Observations of Laksmi's resting behaviour

Our study covers observational data on Laksmi's lying rest from 1.09.2019 until

7.06.2021. Bouts of lying down were observed directly or by camera observation and recorded accurately to a resolution of 5 minutes in the 'keeper diary'. In order to compare Laksmi's lying data, we calculated descriptive statistics, categorizing them into phase 1 (1.09.2019 – 28.02.2020) covering the baseline before the period of reluctance to have any lying rest at all, and phase 2 (16.08.2020 – 7.06.2021) covering the time after resumption of lying rest in the mid of August 2020 (Table 2).

Table 2. Side specific lying rest data of Laksmi.

	Phase 1	Phase 2
N lying bouts	174	557
N lying bouts on the left side	174	342
N lying bouts on the right side	0	215
% of lying bouts on the left side	100	61.4
% of lying bouts on the right side	0	38.6
Mean duration of lying bouts on the left side [hours ± SD]	2.17 ± 0.04	1.17 ± 0.03
Mean duration of lying bouts on the right side [hours ± SD]	0	0.75 ± 0.02
N days	181	296
N days without lying rest	42	32
% of days without lying rest	23.2	10.8

Since arrival at the new facility, Laksmi showed lateral lying rest exclusively on the left side. This is likely due to the stiffness in the right front leg. On average, she spent around 1.6 h a day resting in a recumbent position. At the end of February 2020, she suddenly stopped lying down at all. Although the keeper team did a continuous and accurate monitoring of the elephant's resting behaviour, they were not able to determine any reason for the abrupt reluctance of having lying rest.

Assuming a painful condition as the underlying cause, the dose of Phenylbutazone was increased to 5 g per day. This did not show any effect, and Phenylbutazone was discontinued at the end of May 2020. Until the end of July, Laksmi had lying rest only on one single day (two lying bouts of 5 and 35 minutes duration) on her left side. Data on the amount of her leaning rest were not available. Therefore, it is not possible to investigate whether Laksmi tried to compensate for her lack of lying rest by increasing leaning rest.

On the 1st of August 2020, the keeper team created a steep sand bank with a slope of around 45° in the elephant barn against the wall. The following night, the elephant made use of this slope to have 15 min of lying rest on her right side. Two weeks later she spontaneously lay down on a steep loamy bank (at a slope of approximately 55°) during a walk in the forest and rested there in a leaning-lying position for 30 min on the right side (Fig. 1A). During the following weeks, the caregivers walked with Laksmi to the bank in the forest on a daily basis, which allowed her to have lying rest there (Fig. 1).

At the same time, they reconstructed a sand bank in the elephant house with a slope similar to the steep bank in the forest. The steepness of this slope reached only around 45° due to the structure of the sand (Fig. 2). It took another six weeks for Laksmi to adapt to this new feature when having lying rest on the sand slope became a regular observation. From the beginning, Laksmi showed lying rest on the sand



Figure 1. Laksmi having right lateral lying rest on the steep bank in the forest (A) from where she is able to get up easily (B). In the same location the elephant laid down on the left body side (C and D). Note how interaction takes place with the malleable substrate and in doing so, the female shaped the ground to the needs for comfortable lying rest (C). Also note the ditch at the bottom of the slope allowing Laksmi to have all legs fully stretched and holding the body position perfectly (A–C).



Figure 2. Laksmi having right lateral lying rest on the sand pile built in the indoor enclosure to mimic the steep bank in the forest.

slope with both sides of the body, with a slight preference for the left lateral position. Her mean daily duration of lying rest increased to nearly 2 h between mid of August 2020 and June 2021 (Fig. 3). Interestingly, once Laksmi began laying down on the sand bank, the number of daily resting bouts was far above her baseline, with a simultaneous decrease in the mean duration of lying bouts (Fig. 4 and Table 2).

Outcome and conclusions

From what we know in healthy elephants, absence of side preference for lying rest is considered the normal situation. Several reports have shown individuals to have a strong side preference either in correlation with physical ailments or unilateral discomfort (e.g. due to asymmetric tusks) (Schiffmann *et al.* 2018a, 2019). Although extended duration of lying bouts in zoo elephants compared to free-ranging



individuals might be interpreted as an indicator of increased welfare (in particular, safety from predation), they may also be caused by physical handicaps in certain individuals (Schiffmann *et al.* 2018b). Therefore, we consider the obvious change in Laksmi's resting behaviour with a shift to the bilateral lying pattern and shorter, but more frequent lying bouts (Fig. 5) as a significant indicator of improved welfare. This is corroborated by the finding of fewer days without any lying rest since mid August 2020 (Fig. 3 and Table 2). With respect to her chronic and severe health issues, such a development in the direction towards a normal resting behaviour with a nearly balanced laterality cannot be expected at all.

We can only speculate what caused Laksmi's temporary reluctance of lying rest. The confirmed pathologies in her uterus might have led to discomfort when lying on her lateral body

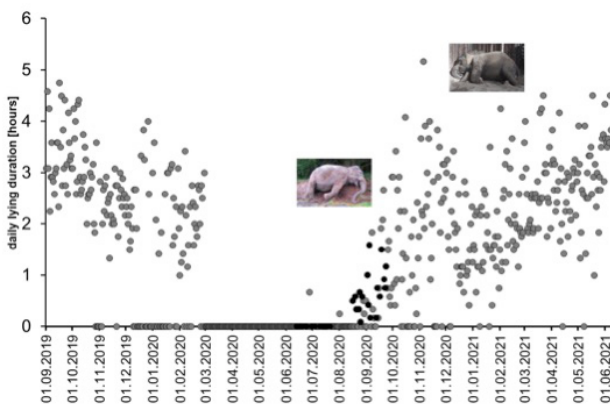


Figure 3. Total daily lying duration from 1.09.2019 until 7.06.2021. Black dots indicate days on which Laksmi had at least one lying bout on the bank in the forest.

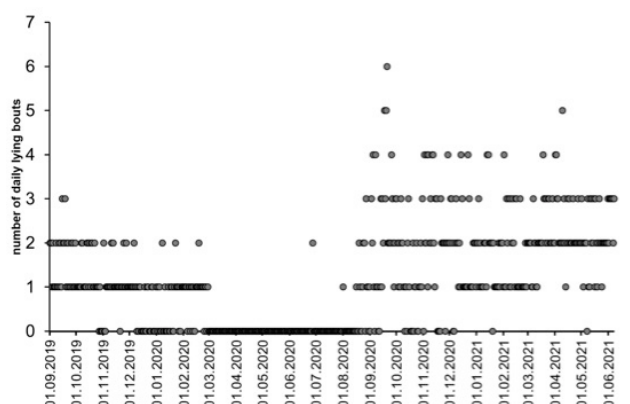


Figure 4. Number of daily lying bouts over the study period. Note the increased number of lying bouts after Laksmi's resumption of lying rest in August 2020.

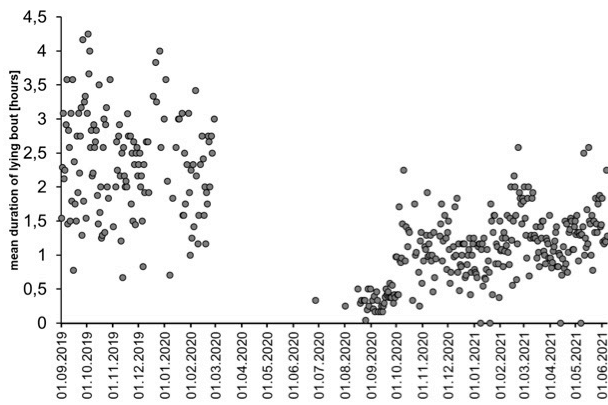


Figure 5. Mean duration of lying bouts over the study period. Note the different pattern before and after the period of cessation of lying rest. Whereas the duration of lying bouts did not decrease before the cessation of lying down, there was an apparent increase in bout length after resumption.

wall through pressure or tension on these organs. But also a musculoskeletal disorder in her left back leg (although not diagnosed) might have led to the reluctance of lying on the left side. Keeping in mind that she had been lying down exclusively in the left lateral position, this is a likely explanation for the sudden stop. Subsequently, it might have taken time to become used to lying down in the right lateral position, as she would have had to learn how to work around the stiffness of her front right elbow joint.

The keepers introduced physiotherapy as recommended by the consultant vet. These included having a ditch and logs in the middle of the barn as an obstacle that Laksmi would have to stretch to climb over and as such regularly extending and stretching muscles and joints that she may otherwise be reluctant to use. The keepers also introduced exercises for Laksmi to lift each leg both forwards and backwards in her daily training. These exercises would have helped Laksmi gain extra flexibility needed to be able to lie down again. We are not aware of any other elephant, which is capable of lying down on the side of a leg with a stiff elbow joint. Such an issue might result in a tedious process in an elephant when lying down (Schiffmann *et al.* 2018a).

Laksmi's daily duration of lying down decreased from an average of 4 h, to 2 h before it ceased completely (Fig. 3). After resuming lying rest, the absolute amount of lying rest showed an increasing trend (Fig. 3). The breakthrough in this process seemed to be the steep loamy bank in the forest, which allowed her to find a comfortable position and facilitated the movement of getting back up again (Fig. 1B).

In this specific case, the positive development was made possible through the dedicated work of Laksmi's caregivers and the opportunity to provide her with a forest environment containing a variety of opportunities. This situation might be unique and of course only feasible in a free contact management system. Nevertheless, this case is highly instructive for any management system, emphasizing the importance of providing an elephant reluctant to lay down, with many different structures in the environment to facilitate resumption of lying rest.

Finding a substrate that allows the construction of slopes steeper than 45° would be progressive in the care of geriatric and/or physically handicapped elephants. The loamy bank had a small ditch at the bottom that provided a sure foothold so the elephant was confident that she would not slide down (Fig. 1 A–C).

This report emphasizes the importance of close monitoring of the resting behaviour in elephants under our care. In doing so, we may continuously extend our understanding of elephant resting behaviour and subsequently fulfil their requirements for lying rest. The documentation and sharing of such cases will effectively contribute to this process.

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